ORDER ON CONSENT
CWA-VIII-93-36-C

1961255 - R8 SEMS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

JAN 23 1996

Ref: 8ENF-T

Lance Hubbard, Director
Environmental Affairs
Brohm Mining Corporation
P.O. Box 485
Deadwood, South Dakota 57732

Re: Administrative Order on Consent;
Docket No. CWA-VIII-93-36-C

Dear Mr. Hubbard:

On September 14, 1993, an Administrative Order on Consent, signed by EPA and Brohm Mining Corporation became effective (Docket Number CWA-VIII-93-36-C). This Order required Brohm Mining Corporation to monitor their discharge and to implement certain measures in order to come into compliance with the Clean Water Act. Brohm Mining Corporation has complied with the provisions of the Order. Therefore, the file on the Order (Docket Number CWA-VIII-93-36-C) is considered closed.

If you have any questions regarding this letter, please contact Melanie Pallman of my staff at (303) 312-6318.

Sincerely,

Elisabeth Evans
for Carol Rushin
Assistant Regional Administrator
Office of Enforcement, Compliance
and Environmental Justice

cc: Tim Tollefsrud, SDDENR
Dale Cockrell, Murphy, Robinson,
Heckathorn, and Phillips PC
Marv Truhe, Truhe Law Offices
Dale Shay, BMC
Stan Michals, BMC
John Trimble, BMC
Samuel H. Sage, Atlantic States Legal Foundation

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10-1-93

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

IN THE MATTER OF	)	DOCKET NO. CWA-VIII-93-36-C
	)	
Brohm Mining Corporation	)	FINDINGS OF VIOLATION
P.O. Box 485	)	AND
Deadwood, South Dakota 57732	)	ORDER ON CONSENT
	)	
	)	

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I. STATUTORY AUTHORITY

The following FINDINGS OF VIOLATION are made and ORDER ON CONSENT ("ORDER") issued, pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency (hereinafter referred to as "EPA") under Section 309(a) of the Clean Water Act ("CWA" or the "Act"), 33 U.S.C. Section 1319(a), and delegated by her to the Regional Administrator of EPA, Region VIII, and redelegated by the Regional Administrator to the Director, Water Management Division, Region VIII.

II. STATEMENT OF BROHM MINING CORPORATION ("BROHM"):

Pursuant to the EPA's Final National Pollutant Discharge Elimination System ("NPDES") permit application regulations for storm water discharges, 55 Fed. Reg. 74990 (November 16, 1990), Brohm submitted Part I of an NPDES Group Storm Water Permit Application for Storm Water Discharges associated with industrial activity to address any regulated storm water discharges from the Gilt Edge Mine, near Lead, South Dakota ("Gilt Edge"). That application was amended and supplemented on September 28, 1991, pursuant to a June 29, 1991 request from Mr. Ephraim King, Chief of the NPDES Program Branch Permits Division. Subsequently, on

February 18, 1992, Brohm proposed to add-on discharges associated with the inactive, historic tailings piles located in the Strawberry Creek drainage. Also, on October 1, 1992, Brohm submitted Notices of Intent under the South Dakota NPDES General Storm Water Permit promulgated by EPA, 57 Fed. Reg. 41236 (September 9, 1992). On December 31, 1992, EPA issued NPDES general storm water permits to Brohm for the Gilt Edge operation and for the relic tailings in the Strawberry Creek drainage. Although Brohm submitted the NPDES storm water group permit application, EPA Headquarters has not made a final decision whether Gilt Edge is appropriately within the NPDES group permit application process for storm water discharges associated with industrial activity.

Brohm believes that it has already satisfied its existing obligations under the CWA for the alleged discharges at Gilt Edge through the timely submittal of the NPDES group permit application and the NPDES general storm water permits.

The following Findings of Fact are made solely by EPA. In signing this Order on Consent, Brohm neither admits nor denies the Findings of Fact nor does it admit that it engaged in any wrong-doing. As such, and without any admission of liability, Brohm consents to the issuance of this Order on Consent.

III. FINDINGS OF FACT AND VIOLATION

The Director finds:

1. Brohm Mining Corporation ("Brohm"), owns and operates a

gold mining and milling operation, known as the Gilt Edge Mine ("Gilt Edge"), located approximately four miles southeast of Lead, South Dakota in Section 5, 6, 7 & 8, Township 4 North, Range 4 East. Brohm is a "person" within the meaning of Section 502(5) of the CWA, 33 U.S.C. Section 1362(5).

2. The Gilt Edge's general operation includes: the extraction of ore and waste rock from an open pit mine; waste rock loading, hauling, and deposition; ore crushing; ore loading, hauling, leaching; spent ore detoxification, unloading and deposition of the spent ore.

3. Gilt Edge produces gold from open-pit operations. Mines that produce gold from open-pit operations are subject to the effluent guidelines for ore mining and dressing as defined by 40 CFR Section 440.100 (a)(1).

4. During an inspection of Gilt Edge on May 19, 1992, EPA determined that Gilt Edge was discharging pollutants within the meaning of Section 502(6) of the CWA, 33 U.S.C. Section 1362(6), from the following area:

> Ruby Gulch: A seep from the toe of a waste pile, composed of waste rock and spent ore, discharged into Ruby Gulch. According to their August 25, 1992 response to EPA's July 19, 1992 request for information pursuant to Section 308 of the Clean Water Act, Respondent has placed waste rock into Ruby Gulch since July, 1988 and Respondent has placed spent ore into Ruby Gulch since April 21, 1989. Respondent has provided data that indicates a seep was in existence prior to the deposition of waste rock and spent ore into Ruby Gulch and EPA believes the seep has discharged pollutants since May 3, 1990. On May 19, 1992, EPA sampled the seep and the results concluded the following pollutants were present in the discharge:

Parameter	Result[1]
Total Recoverable Aluminum	9.8
Total Recoverable Copper	1.02
Total Recoverable Zinc	0.95
Total Recoverable Lead	<0.003
Total Recoverable Cadmium	0.023
pH	4.65

[1] in mg/L except pH which is in S.U.

5. Pursuant to the Findings of Violation and Order for Compliance (Docket Number CWA-VIII-93-04-C) issued by EPA on November 24, 1992, Brohm has been monitoring the quality of the discharge from the sedimentation pond below the seep in Ruby Gulch. The significant results of this monitoring have been summarized and are attached to this Order as Attachment A.

6. The discharge into Ruby Gulch described in Paragraphs 4 and 5, above, and in Attachment A originates from "point sources" within the meaning of Section 502(14) of the CWA, 33 U.S.C. Section 1362(14).

7. During an inspection of Gilt Edge on May 19, 1992, EPA determined that pollutants within the meaning of Section 502(6) of the CWA, 33 U.S.C. Section 1362(6), were being discharged from the following area:

> Strawberry Creek: Pollutants from active areas of the mine which constitute mine drainage are entering the Strawberry Creek diversion culvert through sedimentation ponds. On May 19, 1992, EPA sampled the Strawberry Creek diversion culvert and the results concluded the following pollutants were present in the discharge:

Parameter	Result[1]
Total Recoverable Aluminum	19.6
Total Recoverable Copper	1.11
Total Recoverable Zinc	1.482
Total Recoverable Lead	<0.003
Total Recoverable Cadmium	0.025
pH	3.09

[1] in mg/L except pH which is in S.U.

Mine drainage also flows along the outside of the diversion culvert installed by Respondent into Strawberry Creek. On May 19, 1992, EPA sampled Strawberry Creek downstream of the diversion culvert and the results concluded the following pollutants were present:

Parameter	Result[1]
Total Recoverable Aluminum	34.0
Total Recoverable Copper	1.91
Total Recoverable Zinc	1.88
Total Recoverable Lead	<0.003
Total Recoverable Cadmium	0.029
Total Recoverable Iron	18.5
pH	2.87

[1] in mg/L except pH which is in S.U.

8. Pursuant to the Findings of Violation and Order for Compliance (Docket Number CWA-VIII-93-04-C) issued by EPA on November 24, 1992, Brohm has been monitoring the quality of Strawberry Creek at SW-2. The significant results of this monitoring have been summarized and are attached to this Order as Attachment B.

9. As part of the Strawberry Creek pollutant loading evaluation required by the Findings of Violation and Order for Compliance (Docket Number CWA-VIII-93-04-C) issued by EPA on November 24, 1992, Brohm discovered a seep in Strawberry between sedimentation ponds D and E. This seep may be affecting the water quality of Strawberry Creek.

10. The discharges from Gilt Edge into Strawberry Creek described in Paragraphs 7, 8, and 9 above, and in Attachment B originate from "point sources" within the meaning of Section 502(14) of the CWA, 33 U.S.C. Section 1362(14).

11. Strawberry Creek and Ruby Gulch are "waters of the United States" within the meaning of Section 502(7) of the CWA, 33 U.S.C. Section 1362(7).

12. The discharge of pollutants from a point source by Respondent, into the waters of the United States, without first obtaining the requisite permit pursuant to Section 402 of the Act, 33 U.S.C. Section 1342, constitutes a violation of Section 301 of the Act, 33 U.S.C. Section 1311.

IV. ORDER ON CONSENT

Based upon the foregoing FINDINGS, EPA Region VIII hereby ORDERS AND RESPONDENT HEREBY CONSENTS, that:

13. Upon its effective date, this Order on Consent shall supersede and replace the Findings of Violation and Order for Compliance (Docket No. CWA-VIII-93-04-C) issued to Respondent on November 24, 1992.

14. This Order on Consent shall be binding upon Brohm Mining Corporation, its agents, authorized representatives, and successors or assigns, and any individual or business entity that may purchase or otherwise receive the Gilt Edge Mine as described in Paragraph 1, above, prior to the closure of this Order on Consent.

15. Respondent shall be in immediate compliance with Section 301 of the Clean Water Act. Respondent shall terminate all discharges of pollutants to waters of the United States except as authorized by a valid permit issued pursuant to the Clean Water Act, 33 U.S.C. Section 401, et seq.

16. If the Respondent is unable to cease discharge, or is unable to comply with the effluent limits for Strawberry Creek and Ruby Gulch at compliance points 001, 002 & 003 in NPDES Permit No. SD-0026891, Respondent must take all measures including interim treatment to reduce the quantity of metals and increase pH in the discharge in accordance with the schedule for compliance outlined in Paragraph 20 of this Order on Consent to comply with the interim discharge limits outlined in Paragraphs 17 and 18 below.

Discharge Limits

17. Ruby Gulch: Respondent shall design, construct and operate interim treatment or other pollutant reducing measures, in accordance with the schedule for compliance outlined in Paragraph 20 of this Order on Consent, to meet the following discharge limits at Compliance Points 002 and 003 as defined in NPDES Permit No. SD-0026891:

Parameters	Daily a/ Maximum	30-day b/ Average
Total Recoverable Cadmium, mg/L	0.10	0.05
Total Recoverable Copper, mg/L	0.30	0.15
Total Recoverable Lead, mg/L	0.60	0.30
Total Recoverable Mercury, mg/L	0.002	0.001
Total Recoverable Selenium, mg/L	0.00875	
Total Recoverable Zinc, mg/L	1.50	0.75
Total Suspended Solids, mg/L (dry weather)	30.0 c/d/f/	20.0 c/d/f/

Total Settleable Solids, mL/L (wet weather only)	0.5	c/e/f/
Total Cyanide, mg/L	0.07	

The pH at Compliance Point 002 shall be greater than 6.0 units and less than 9.0 units at all times.

Total Petroleum Hydrocarbons shall not exceed 10 mg/L or impart a visible film or sheen to the surface of the water or adjoining shorelines.

There shall be no in-stream treatment of Ruby Gulch, unless the proper permits are obtained in accordance with Section 404 of the Clean Water Act.

a/ The "Daily maximum" ("Daily Max.) is the maximum value allowable in any single sample of instantaneous measurement.

b/ The "30-day (and monthly) average" is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. The calendar month shall be used for purposes of reporting self-monitoring data.

c/ No discharge limits are applicable during a precipitation event of greater than the 10-year 24-hour event, if the sedimentation control facilities have been constructed and maintained to contain a 10-year 24-hour precipitation event.

d/ Dry weather is considered to exist whenever the wet weather is not occurring.

e/ Wet weather exists, during any 7 day period, when precipitation (or snow melt) has occurred, during the 7 day period, at a level sufficient to increase runoff at a compliance point.

f/ During and for two days following any period(s) when reclamation and/or treatment of the waste pile in Ruby Gulch is/are occurring, these limits do not apply. However, Best Management Practices will be implemented and followed to control sedimentation during these activities. It is Respondents' responsibility to inform EPA and SDDENR of their construction/reclamation schedule. Failure to notify EPA and SDDENR of construction/reclamation activities will void this provision.

18. Strawberry Creek: Respondent shall design, construct and operate interim treatment or other pollutant reducing measures, in accordance with the schedule for compliance outlined in Paragraph 20 of this Order on Consent, to meet the following interim discharge limits at Compliance Point 001:

Parameters	Daily a/ Maximum	30-day a/b/ Average
Total Recoverable Cadmium, mg/L	0.10	0.05
Total Recoverable Copper, mg/L	0.30	0.15
Total Recoverable Lead, mg/L	0.60	0.30
Total Recoverable Mercury, mg/L	0.002	0.001
Total Recoverable Zinc, mg/L	1.50	0.75
Total Suspended Solids, mg/L	157.5 c/d/	90.0 c/d/

The pH at Compliance Point 001 shall be greater than 6.0 units and less than 9.0 units at all times.

Total Petroleum Hydrocarbons shall not exceed 10 mg/L or impart a visible film or sheen to the surface of the water or adjoining shorelines.

There shall be no in-stream treatment of Strawberry Creek, unless the proper permits are obtained in accordance with Section 404 of the Clean Water Act.

a/ The "Daily maximum" ("Daily Max.) is the maximum value allowable in any single sample of instantaneous measurement.

b/ The "30-day (and monthly) average" is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. The calendar month shall be used for purposes of reporting self-monitoring data.

c/ During runoff events, natural conditions may cause the limit for TSS to be exceeded. If the permittee believes this will occur, they shall be allowed to monitor the TSS at the upstream boundary of their property at the monitoring station SW-1 (as labeled by Brohm). If Compliance Point 001 exceeds the daily limit for TSS during a runoff event, the TSS concentration at Compliance Point 001 shall not exceed the ambient TSS. This provision only applies if the TSS measured at SW-1 is greater than the daily limit for Compliance Point 001.

d/ During and for two days following any period(s) when excavation in Strawberry Creek or reclamation and/or treatment of the waste pile in Ruby Gulch is/are occurring, these limits do not apply. However, Best Management Practices will be implemented and followed to control sedimentation during these activities.

19. Respondent shall also implement the final "Interim Compliance Plan," developed in accordance with the Findings of Violation and Order for Compliance (Docket Number CWA-VIII-93-04-C) issued by EPA on November 24, 1992, and incorporated herein, in accordance with the compliance schedule outlined in Paragraph 20 of this Order on Consent.

Compliance Schedule

20. All of the submittal dates and milestones required by this Order (and previous Order for Compliance) have been incorporated into the following compliance schedule:

Milestone	Compliance Date
Begin investigation of the integrity of the culvert in Strawberry Creek and begin replacement corroded culvert	3/15/93
Begin investigation to more readily identify the seep at the base of the Dakota Maid pit and feasibility of pump back system for the seep	4/1/93
Complete the design of the chemical feed system for Ruby Gulch	4/1/93
Complete the enlargement and clearing of the sedimentation basin in Ruby Gulch	5/1/93
Complete the construction of the treatment system in Ruby Gulch	5/1/93
Achieve discharge limitations in Ruby Gulch	6/30/93
Complete removal of tailings and replacement of the culvert in Strawberry Creek.	60 days after approval is received from SDDENR
Begin the design of the interim treatment system for Strawberry Creek	9/1/93
Perform monitoring as outlined in the Strawberry Creek Pollutant Loading Evaluation Plan and submit result to EPA	10/1/93
Begin construction of the interim treatment system in Strawberry Creek	3/1/94
Complete construction of interim treatment system in Strawberry Creek	5/1/94
Comply with interim discharge limitations in Strawberry Creek	5/30/94

Monitoring Requirements

21. As a minimum, upon the effective date of this Order, the following constituents listed in Paragraph 22 shall be monitored at the frequency and with the type of measurement indicated at the locations specified in Paragraph 22 below. Samples or measurements shall be representative of the volume and nature of the monitored flow. If no discharge occurs during the entire monitoring period, it shall be stated that no discharge or overflow occurred.

Discharge monitoring results shall be submitted for each month postmarked no later than the 28th of the following month. Any additional water quality monitoring performed at the monitoring points described in Paragraphs 22 and 23 shall be submitted with the discharge monitoring results.

The samples shall be taken and analyzed in accordance with 40 CFR Part 136. Analytical detection limits shall be at or below South Dakota water quality standard or EPA "gold book" criteria or the detection limit shall be the lowest of the EPA approved methods. Whole effluent toxicity monitoring shall follow the EPA, Region VIII protocol.

The requirements of Paragraph 22 will be superseded upon the effective date of a NPDES permit for the Respondent's facility. The monitoring requirements in Paragraphs 21 and 23 will be in effect until this Order is closed by EPA.

22. Self-monitoring Compliance Points: Discharges to Ruby Gulch shall be monitored in the Gulch at the points to be designated as Compliance points 002 or 003 in NPDES permit no. SD-0026891 which is scheduled to be issued for Gilt Edge. Following the NPDES permit, Ruby Gulch shall be monitored initially at Compliance Point 002. After the completion of additional sedimentation facilities, Brohm may request a change in monitoring to Compliance Point 003. This request should be made to EPA in accordance with the "Change in Discharge" provision in NPDES permit no. SD-0026891. Discharges to Strawberry Creek shall be monitored in Strawberry Creek 10 yards below the confluence of Strawberry Creek and Boomer Gulch, at the point to be designated as Compliance Point 001 in NPDES permit no. SD-0026891.

Parameters	Frequency	Sample Type
Flow, MGD	a/	Instantaneous or Continuous
Total Suspended Solids	Weekly	Grab
Total Petroleum Hydrocarbons	Weekly	Visual/Grab b/
pH	a/ e/	Instantaneous
Temperature	Weekly c/	Instantaneous
Ammonia-Nitrogen	Biweekly	Grab
Nitrate/Nitrite (as N)	Biweekly d/	Grab
Cyanide-Total	Biweekly d/	Grab
Cyanide-Weak Acid Dissociable	Biweekly d/	Grab
Hardness	Weekly e/	Grab
Total Recoverable Aluminum	Weekly	Grab
Total Recoverable Arsenic	Monthly	Grab
Total Recoverable Beryllium	Monthly	Grab
Total Recoverable Cadmium	Weekly	Grab
Total Recoverable Chromium	Monthly	Grab
Total Recoverable Copper	Weekly	Grab
Total Recoverable Iron	Monthly	Grab
Total Recoverable Lead	Weekly	Grab
Total Recoverable Manganese	Monthly	Grab
Total Recoverable Mercury	Monthly	Grab
Total Recoverable Nickel	Monthly	Grab
Total Recoverable Selenium	Monthly	Grab
Total Recoverable Silver	Monthly	Grab
Total Recoverable Zinc	Weekly	Grab
WET, Acute	Quarterly	Grab

a/ Flow in Strawberry Creek at Compliance point 001 shall be measured daily; pH shall be monitored weekly at Compliance Point 001. Flow and pH in Ruby Gulch at Compliance point 002 or 003 shall be measured weekly.

b/ TPH shall be visually monitored weekly. A grab sample shall be collected if a sheen is observed and shall be determined using EPA modified method 8015.

c/ Ammonia-Nitrogen shall be sampled every two weeks. The temperature and pH shall be recorded at the same time.

d/ These parameters shall be measured at least once every two weeks.

e/ Hardness shall be measured at the same time as the metals are sampled.

23. Seeps in Strawberry Creek: Upon the effective date of this Order, Respondent shall monitor the following parameters at the specified frequencies at the seep located in Strawberry Creek between sedimentation ponds D and E. The seep shall be monitored prior to mixing with Strawberry Creek.

Parameters	Frequency	Sample Type
Flow, MGD	Daily a/	Instantaneous or Continuous
Total Suspended Solids	Weekly	Grab
Total Petroleum Hydrocarbons	Monthly b/	Visual
pH	Daily c/	Instantaneous
Temperature	Weekly c/	Instantaneous
Ammonia-Nitrogen	Weekly c/	Grab
Nitrate/Nitrite (as N)	Weekly c/	Grab
Cyanide-Weak Acid Dissociable	BiWeekly d/	Grab
Hardness	Weekly e/	Grab
Total Recoverable Aluminum	Weekly	Grab
Total Recoverable Arsenic	Monthly	Grab
Total Recoverable Cadmium	Weekly	Grab
Total Recoverable Copper	Weekly	Grab
Total Recoverable Iron	Monthly	Grab
Total Recoverable Lead	Weekly	Grab
Total Recoverable Manganese	Monthly	Grab
Total Recoverable Mercury	Monthly	Grab
Total Recoverable Nickel	Monthly	Grab
Total Recoverable Selenium	Monthly	Grab
Total Recoverable Silver	Monthly	Grab
Total Recoverable Zinc	Weekly	Grab

a/ Flow and pH shall be measured daily when the seep is flowing. If the flow is too low to be measured, a visual estimate may be used. If the seep is not flowing, "no flow" should be indicated and monitoring is not required.

b/ TPH shall be visually monitored monthly. A grab sample shall be collected if a sheen is observed and shall be determined using EPA modified method 8015.

c/ Ammonia-Nitrogen shall be sampled every two weeks. The temperature and pH shall be recorded at the same time.

d/ These parameters shall be measured at least once every two weeks.

e/ Hardness shall be measured at the same time as the metals are sampled.

24. Respondent shall also implement the final Strawberry Creek loadings evaluation plan. The schedule for implementing the plan has been incorporated into the compliance schedule in Paragraph 20 of this Order on Consent. The evaluation shall be conducted in accordance with the Strawberry Creek Loadings Evaluation Plan submitted to EPA on June 4, 1993, and incorporated herein.

completed submitted 9-28-93 Rec'd 9-29-9

25. Brohm agrees not to: 1) contest the terms of NPDES permit number SD-0026891 and 2) request an evidentiary hearing for said permit. However, this paragraph does not include or restrict in any way or manner any right or ability Brohm may now have or may have in the future to request modification(s) of or variance(s) to NPDES permit number SD-0026891 for causes including, but not limited to, alterations or additions to the permitted facility or activity; development of new information; changes to the standards, guidelines or regulations on which the permit was based by promulgation of new or amended standards, guidelines or regulations or by judicial decision; or correction of technical mistakes, such as errors in calculation, mistaken interpretations of law; or pursuant to any applicable federal or state law or regulation.

26. Brohm agrees to make demand upon any financial mechanisms available to it for the purpose of enabling Brohm to bring the Gilt Edge mine into compliance with NPDES Permit No. SD-0026891.

27. If an event, including but not limited to delays in completion of reorganization or financing of Brohm causes or may cause delay in the achievement of the requirements of this Order on Consent, Respondent shall notify EPA orally as soon as possible and in writing within ten (10) working days from the date Respondent first knew or should have known of such an event. The Respondent's written notice shall specify the length of the anticipated delay, the cause(s) of the delay, the measures taken or to be taken by Respondent to prevent or minimize the delay and to prevent future delays, and a timetable by which those measures have been or will be implemented. Failure by the Respondent to provide the notice required by this section shall render this section void as to the particular incident involved, and shall constitute a waiver of the Respondent's right to obtain an extension of time for its obligations under this section based on such incident.

28. If the Respondent demonstrates that the delay or the anticipated delay has been or will be caused by circumstances beyond the Respondent's reasonable control (or the reasonable control of any of the Respondent's agents), and that the Respondent has taken all reasonable measures to prevent or

minimize such a delay, EPA may excuse performance, extend the time for performance of such requirement for a period not to exceed the actual delay resulting from such circumstances, or re-negotiate this Order on Consent with Brohm. EPA's determination on these matters shall be made as soon as possible, in writing, after the receipt of the Respondent's written notification of the event. Any extension of one compliance date based on a particular incident will not necessarily result in an extension of a subsequent compliance date or dates. The Respondent must make an individual showing of proof regarding each delayed incremental step or other requirement for which an extension is sought.

29. All notices and/or reports required by this Order shall be sent to EPA with a copy provided to the State of South Dakota at the following addresses:

Melanie Pallman
NPDES Branch
Management Division
U.S. Environmental
Protection Agency
999 18th Street, Suite 500
Denver, CO 80202-2466

Tim Tollefsrud
South Dakota Department of
Environmental and Natural
Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181

30. Any deliverables, plans, reports, specifications, schedules and attachments required by this Order are, upon approval by EPA, incorporated into this Order. Any non-compliance with such EPA-approved deliverables, plans, reports, specifications, schedules, and attachments shall be deemed a failure to comply with this Order and subject to EPA enforcement action.

31. Brohm shall allow access by any authorized representatives of EPA and South Dakota Department of Environment and Natural Resources, upon proper presentation of credentials, to sites and records relevant to this Order for any of the following purposes:

a. To inspect and monitor progress of the activities required by this Order;
b. To inspect and monitor compliance with this Order; and
c. To verify data submitted to EPA.

This Order shall in no way limit or otherwise affect EPA's authority to enter, conduct inspections, have access to records, or monitor compliance pursuant to any statute, regulation, permit, or court order.

32. In accordance with 33 U.S.C. Section 1319(d), failure to comply with this Order may result in civil penalties of up to $25,000 per day for each violation of Section 301 of the Clean Water Act, 33 U.S.C. Section 1311, and 33 U.S.C. Section 1319(c) authorizes fines and imprisonment for willful or negligent violations of the Clean Water Act. FURTHER, the Criminal Fine Enforcement Act of 1984, P.L. 98-596, provides for fines in excess of the amount specified in the statute under certain circumstances.

V. EFFECTIVE DATE

This Consent Agreement and Order shall become effective upon the date executed by EPA.

SO ORDERED AND AGREED:

BROHM MINING CORPORATION:

_____ _____

Alan R. Bell, President
Brohm Mining Corporation

Date

ENVIRONMENTAL PROTECTION AGENCY:

_____ 9/14/93

Max H. Dodson, Director
Water Management Division
U.S. Environmental Protection Agency
999 18th Street, Suite 500
Denver, Colorado 80202-2405

Date

STATE OF COLORADO)
)ss.
COUNTY OF Adams)

On this 7th day of September 1993, before me the undersigned officer, personally appeared Alan R. Bell, who acknowledged himself to be the President of MinVen Gold Corporation, and that he, as President, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as Presidnet.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Kayron L. McCoy
Notary Public, Colorado

KAYRON McCOY
Notary Public, State of Colorado
County Of Adams
My Commission Expires Sept. 23, 1994

(SEAL)
My Commission Expires: Sept. 23, 1994

In the Matter of:
Brohm Mining Corporation
Deadwood, South Dakota 57732
Docket No.: CWA-VIII-93-36-C

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY THAT ON THE DATE SET FORTH BELOW, I hand-delivered and filed with Regional Hearing Clerk, the original of the "Findings of Violation and Order on Consent":

Original by Hand:
Joanne M. McKinstry
Regional Hearing Clerk
U.S. EPA, Region VIII
Denver Place, 7th Floor
999 18th Street, Suite 500
Denver, Colorado 80202-2466

copy by hand to:
Libby Bohanon, Attorney
Regional Counsel, 7th Floor

I FURTHER CERTIFY THAT ON THE DATE SET FORTH BELOW, a true copy of the "Findings of Violation and Order on Consent" was sent by Certified Mail, Return Receipt Requested to:

Alan R. Bell, President
Brohm Mining Corporation
c/o MinVen Gold Corporation
410 17th Street, Suite 2450
Denver, Colorado 80202

Cert#: P 144 988 076

Date: September 16, 1993

Judith M. Kobus-Fisk

Judith M. Kobus-Fisk, USEPA
Program Support Section,
NPDES Branch, WMD

BROHM MINING CORPORATION

GILT EDGE MINE

STRAWBERRY CREEK LOADING EVALUATION REPORT

Prepared for:

BROHM MINING CORPORATION
P.O. Box 485
Deadwood, South Dakota 57732

Prepared by:

P.M. DE DYCKER & ASSOCIATES, INC.
12596 W. Bayaud Ave. Suite 380
Lakewood, Colorado 80228

and

WATER, WASTE & LAND, INC.
2629 Redwing Road Suite 200
Ft. Collins, Colorado 80526

September 1993

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Strawberry Creek is located in a small, south and east trending valley that drains an area of approximately one square mile. The drainage area extends a distance of about two miles from an elevation of approximately 5,700 feet, just north of the mine, to the confluence with Bear Butte Creek at an elevation of approximately 4,900 feet. Major contributions to flow in Strawberry Creek originate from undisturbed areas north and west of the mine facilities, tributaries and runoff from undisturbed areas south of the mine, and runoff from portions of the mine including fill slopes in the leach pad and surge pond areas. Surface water discharge does not occur from the mine pits. Runoff from the waste rock dumps, in their current configuration, does not discharge into the Strawberry Creek catchment.

The Strawberry Creek catchment starts immediately northwest of the leach pad and topsoil storage pile at the mine and flows past the west side of the topsoil storage pile, as shown on Plate 1. Flow in the creek is diverted through the active mine area in a buried corrugated metal pipe (CMP) culvert which discharges to the Strawberry Creek channel below the mine. Surface water runoff from undisturbed and disturbed areas in the vicinity of the mine is intercepted by a system of sedimentation ponds (labeled Pond A through Pond E in a downstream direction). Pond A retains runoff from portions of the topsoil storage pile and fill slopes of the leach pad. Overflow from Pond B is directed into the CMP inlet. Overflows from the sediment ponds C, D, and E discharge into the CMP through individual stand pipes during high runoff periods. A French drain is constructed beneath the fill on which the process plant and surge pond are located. Flow in the French drain discharges into Pond C which is connected to the CMP by a standpipe.

In several areas, the base of the CMP has deteriorated due to contact with relic tailings and low pH waters. The deterioration has resulted in leakage from the CMP at numerous locations. In the past, BMC has replaced several sections of the deteriorated CMP in an attempt to reduce the leakage from the CMP.

Several changes were made to the diversion system in upper Strawberry Creek by BMC between the high-flow and low-flow sampling events. Prior to the high-flow sampling event in May, 1993, the CMP paralleled the Strawberry Creek channel for approximately 2,500 feet and discharged into the creek below the mine site immediately upstream of Pond E and west of the Sunday pit. Subsequent to the high-flow sampling event, Pond D and the lower portion of the CMP was removed. The CMP now terminates immediately below Pond C on the east side of the mine road. Discharge from the CMP flows along the excavated path of the CMP in the approximate alignment of the original Strawberry Creek channel.

Below Pond E, Strawberry Creek flows south and east approximately 1.2 miles before discharging into Bear Butte Creek. Three primary tributaries enter Strawberry Creek in the lower reach below the Gilt Edge facility. Cabin Gulch joins Strawberry Creek approximately 700 feet downstream of Pond E. Hoodoo Gulch, a relatively small tributary, joins Strawberry Creek approximately 4,000 feet below the mine site. Hoodoo Gulch originates at several sediment ponds just southeast of the Sunday pit. Another major tributary, Boomer Gulch, joins Strawberry Creek from the south approximately 1,500 feet above the confluence of Strawberry Creek and Bear Butte Creek. Other inflows to Strawberry Creek downstream of the mine site include a drainage conveying runoff from the mine access road which joins the creek 800 feet below the mine, and a small tributary which enters the creek from the Orifino mine located 1,400 feet upstream of Hoodoo Gulch.

Metal loads in Strawberry Creek can be associated with a few sources. These sources include flows originating from seeps, surface water in contact with reaches of relic tailings, and flows leaking through holes in the CMP. Relatively higher metal loads were observed in several reaches of Strawberry Creek including a drainage parallel to the lower portion of the CMP, flows at the CMP outlet and flow below Pond E.

2.0 SAMPLING AND ANALYSIS APPROACH

Field activities were conducted according to procedures and methods presented in the Strawberry Creek Water Sampling Plan (WWL, 1993). Water quality samples, stream sediment samples, field parameters, and flow rate measurements were collected at the sampling locations. Samples were collected from all identifiable sources of inflow to Strawberry Creek, from Strawberry Creek above and below inflow sources, and at other appropriate locations in Strawberry Creek, such as from sediment ponds and across reaches of relic tailings. Samples were also collected from the two mine pits.

Sampling locations were identified by a reconnaissance of site conditions conducted prior to the high-flow sampling event. If flow was present, samples were collected during the low-flow sampling event at identical locations as the high-flow sampling event. However, many of previous sampling locations were dry during the low-flow sampling event, especially in the headwaters of Strawberry Creek. Several new sampling locations were added during the low-flow sampling event, primarily as a result of modifications to the CMP in upper Strawberry Creek. Samples were collected at a total of 44 locations during the high-flow event and at 35 locations during the low-flow event. Plate 1 identifies the sampling locations and other relevant surface features. Table 1 provides a brief description of all sampling sites in order from downstream to upstream.

For purposes of sampling and analysis, Strawberry Creek was divided into two major segments. Segment A represents the downstream reach of Strawberry Creek below the operational mine area, from Pond E to immediately downstream of the confluence of Strawberry Creek with Bear Butte Creek. Segment B includes the upper portion of Strawberry Creek from its headwaters to upstream of Pond E, and includes the Gilt Edge mine facilities. Strawberry Creek in this upper segment is primarily confined to the CMP. In addition to Strawberry Creek, all seeps, tributaries, ponds and other sources contributing flow to the creek were sampled.

Two sampling teams, A and B corresponding to segments A and B, were deployed to measure field parameters, collect water and sediment samples, and measure flow. Field parameters consisting of pH, temperature, and specific conductance were measured at the time of sample collection. Sampling progressed from downstream to upstream within each segment. Sample locations are identified as SBB(*n*) or SBA(*n*). The first two letters SB represent Strawberry Creek, the third letter "B" or "A" represents segment B or segment A respectively. The number (*n*) identifies the sample site within the segment. Generally, the sampling locations were consecutively numbered, downstream to upstream within each segment. To remain consistent with the numbering system for both sampling events, the identification of sample sites added during the low-flow sampling events were labeled by adding letter "A" or "B" to the end of the closest upstream or downstream sample number. For example, two new seeps identified during the low-flow sampling event upstream of existing site SBB9 were labeled SBB9A and SBB9B.

TABLE 1
SAMPLE LOCATION DESCRIPTIONS

SITE ID	SAMPLED		SITE DESCRIPTION
	5/93	8/93	
SBA1	✓	✓	Bear Butte Creek, downstream of Strawberry Creek confluence, former site SW-3.
SBA2	✓	✓	Bear Butte Creek, upstream of Strawberry Creek confluence, former site SW-8.
SBA3	✓	✓	Strawberry Creek immediately upstream of Bear Butte Creek confluence, former site SW-6.
SBA4	✓	✓	Strawberry Creek below Boomer Gulch confluence.
SBA5	✓	✓	Boomer Gulch above Strawberry Creek confluence.
SBA6	✓	✓	Strawberry Creek above Boomer Gulch confluence.
SBA7	✓	✓	Spring emerging between Boomer Gulch and Hoodoo Gulch.
SBA8	✓	✓	Strawberry Creek downstream of Hoodoo Gulch confluence between beaver dams.
SBA9	✓	✓	Hoodoo Gulch, above the access road along Strawberry Creek.
SBA10	✓	✓	Strawberry Creek upstream of Hoodoo Gulch confluence.
SBA11	✓	✓	Strawberry Creek downstream of Orifino Gulch seep area.
SBA12	✓	✓	Lower Orifino Gulch seep.
SBA13	✓	✓	Orifino Gulch flow along side the Orifino mine shaft.
SBA14	✓	✓	Orifino Gulch, below beaver dam, adjacent to concrete foundation.
SBA15	✓	✓	Strawberry Creek upstream of Orifino Gulch seep area.
SBA16	✓	✓	Strawberry Creek, downstream of Cabin Creek confluence.
SBA17	✓	✓	Cabin Creek, above Strawberry Creek confluence.
SBA18	✓	✓	Strawberry Creek, upstream of Cabin Creek confluence and below the mine access road drainage, former site SW-2.
SBA19	✓	Dry	Drainage from mine access road above Strawberry Creek.
SBA20	✓	Dry	Seep south of the storage shed, flow ponds up and indirectly enters Strawberry Creek.
SBA21	✓	✓	Strawberry Creek above the mine access road drainage.
SBA21A	N/A	✓	Strawberry Creek at the outlet of pond E, upstream of SBA21.
SBA22	✓	✓	Sunday Pit water sample.
SBA23	✓	✓	Dakota Maid Pit water sample.
SBB1	✓	✓	Strawberry Creek approximately 50 feet downstream of the CMP within the relic tailings area and upstream of Pond E.
SBB2	✓	N/A	Strawberry Creek at the CMP outlet.
SBB3	✓	N/A	Strawberry Creek, flow from leakage in the exposed portion of the CMP upstream of the outlet.
SBB4	✓	N/A	Cumulative flow from seeps at the base of the embankment below Pond D, east of the CMP.
SBB4A	N/A	✓	Seep from east embankment of Strawberry Creek drainage, upstream of SBB1.

TABLE 1
SAMPLE LOCATION DESCRIPTIONS

SITE ID	SAMPLED		SITE DESCRIPTION
	5/93	8/93	
SBB5	✓	✓	Pond D, flows through a standpipe and enters the CMP.
SBB6	✓	Dry	Runoff and seep from the west side of mine access road which discharges from a road culvert into the drainage parallel to the CMP and flows to Pond D.
SBB7	✓	Dry	Discharge from an 8-inch corrugated plastic drainage pipe, approximately 5 feet upstream of SBB6. The pipe is aligned in a northeast direction under the mine access road, but the source of flow is unknown.
SBB8	✓	✓	Flow in the drainage parallel to the CMP, passes through relic tailings area downstream of SBB9 and upstream of Pond D.
SBB9	✓	✓	Combined flow from seeps upstream, in a drainage parallel to and east of the CMP, which drains to Pond D.
SBB9A	N/A	✓	Seep from east embankment of Strawberry Creek drainage upstream of SBB9.
SBB9B	N/A	✓	Seep from excavated CMP ditch wall upstream of SBB9.
SBB10	✓	Dry	Strawberry Creek upstream of SBB9 at an opening in the CMP.
SBB10A	N/A	✓	Seep under CMP outlet, upstream of SBB10B, immediately downstream of SBB10.
SBB10B	N/A	✓	Combined seep flow along east embankment of CMP excavation, downstream of SBB10A.
SBB11	✓	✓	Pond C flows through a standpipe to the CMP.
SBB12	✓	Dry	Seep from fill material east of the main access road, flows through a culvert under the french drain and enters Pond C at SBB13.
SBB12A	N/A	✓	Seep flow above pond C.
SBB13	✓	Dry	Combined flows from the French drain on the north bank of Pond C. Former sample FD-1.
SBB14	✓	Dry	Flow from natural drainage upstream and west of Pond C, flows along an access road to Pond C.
SBB15	✓	Dry	Strawberry Creek flow at the entrance to the CMP.
SBB15A	N/A	✓	Pond B water upstream of inlet to CMP, and upstream of SBB15.
SBB16	✓	Dry	Seep above Pond B, upstream of SBB15. Flows into Pond B.
SBB16A	N/A	✓	Seep flow upstream of previous SBB16.
SBB17	✓	Dry	Strawberry Creek upstream of seep SBB16 and below natural (dry) tributary.
SBB18	✓	Dry	Strawberry Creek upstream of site SBB19, formerly called SW-1, above the mine boundary.
SBB19	✓	Dry	Seep at toe of the topsoil storage pile, flows to the access road above SBB17 and east of Strawberry Creek.
SBB20	✓	Dry	Gulch southwest of the process surge pond, flow intercepted by the french drain.
SBB21	✓	Dry	Gulch west of the process surge pond and north of SBB20, flow intercepted by the French drain.

ARACTERISTICS

easured in Strawberry Creek and its tributaries during the high-flow and are graphically depicted on Figures 1 through 3 and Figures 4 through Table 2 and Table 3 provide a tabular summary of flows measured flow and low-flow events. In Table 2 and Table 3, inflows to Strawberry n distinguished as primary or secondary tributaries. Primary tributaries o Strawberry Creek, while secondary tributaries flow directly to primary

gain or loss in flow across each reach of the creek is also shown in able 3. The net gain or loss in flow is calculated by summing the eek flow and tributary inflow within the reach and then subtracting the flow. These calculated gains or losses in flow from the upstream to mpling stations on the creek are referred to as non-point sources (NPS). in in flow within the reach indicates an unidentified source of inflow, water discharge. Conversely, a calculated loss of flow across a reach flow source, such as ground water recharge. It is noted that any flow rrors are included as a gain or loss in flow within a reach. Generally, the flow measurements are judged to be within 10 percent. The flow rror could represent a significant portion of the calculated gain or loss ne relative percent increase or decrease in flow is comparable to the urement error of 10 percent.

gain or loss in flow for a specific reach of Strawberry Creek presented ble 3 can be compared to the measured flow in the reach to provide the relative magnitude of the non-point source flow component. In non-point source gain or loss in flow is a relatively large fraction of the As can be observed in Table 2 for the upper segment of Strawberry B, SBB18 to SBB1), the non-point source flow component contributed

the high-flow event.
to SBA3) an overall
sampling event. The
the total flow in the
cent of the total flow

point source gain in
vberry Creek. Of the
om its headwaters to
or approximately 64
flow occurred in the

gment of Strawberry
vents is difficult given
-flow sampling event
s are however evident
of Strawberry Creek
sampling events, a
rry Creek in the reach
SBA11 to SBA10). A
n between sites SBA8
ally, a relatively large
y Creek from above
) for both events. The
ace ground water flow
ver Strawberry Creek.
sured during both the

3.1 High-Flow Event

At the most upstream site on Strawberry Creek (SBB18, located above the mine site), the measured flow was 11 gpm. Small inflows from seeps combined to generate 26.4 gpm in Strawberry Creek at the point where the flow enters the CMP (SBB15). Downstream of the CMP inlet no other inflows to the CMP were identified until Pond C. It was not possible to measure the flows from Ponds C and D because the overflow enters a stand pipe connected directly to the CMP. Pond C was overflowing into the stand pipe connected to the CMP. The overflow from Pond C (SBB11) was visually estimated to contribute 20 gpm to the flow in the CMP. When compared to the flow of 96.9 gpm at SBB10 and the flow of 26.4 gpm at SBB15, the 20 gpm discharge from Pond C indicates a NPS gain in flow of 50.5 gpm.

Station SBB10 represented a sample location within the CMP at a point where an opening existed in the CMP downstream of Pond C. Sources of flow to Pond C included a seep east of the access road (SBB12), the discharge from the French drain (SBB13), and a natural drainage (SBB14). An alternate method to balance the flow is possible by combining inflows to Pond C consisting of SBB14, SBB13 and SBB12 and the flow at upgradient SBB15 for a combined flow of 139 gpm. This combined flow of 139 gpm when compared to the 96.9 gpm flow at downgradient SBB10 indicates a net flow loss of 42.1 gpm. This flow balance is probably more accurate than using the visual outflow estimate for Pond C.

A drainage originated just above SBB9 from what appeared to be leakage from the CMP. This drainage flowed parallel to and east of the CMP and was in contact with relic tailings. This drainage also received flow from two other sources, 27.4 gpm from SBB6 (a seep below Pond C that drained from a road culvert under the mine road) and 10.4 gpm from SBB7. Sample SBB7 represented the discharge from an 8-inch corrugated plastic pipe which appeared to extend under the mine road, but the source of water was unknown. The drainage continued to flow adjacent to the CMP in contact

with the relic tailings and discharged into pond D. Sample SBB8 was collected from this drainage above Pond D.

Pond D overflowed into the stand pipe connected to the CMP. Sample SBB5 was collected from Pond D. The CMP terminated immediately downstream of Pond D. The base of the CMP between Pond D and the CMP outlet was deteriorated to the point that only a fraction of the flow conveyed by the CMP discharged at the outlet. The flow measured at the CMP outlet (SBB2) was only 14.2 gpm. Flow was discharging at multiple points along the base of the culvert. Sample SBB3 represented the discharge from the CMP at one of the leak points. Due to the multiple discharge points, the total flow from the CMP could not be measured. The flow measured at SBB1, downstream of the CMP outlet, was 182.6 gpm. The NPS gain in flow between SBB1 and SBB10 of 39.2 gpm shown in Table 1 is inaccurate since the total flow at the CMP outlet could not be measured.

Segment A of Strawberry Creek begins below Pond E at SBA21 where the measured flow was 171 gpm. SBA18 in Strawberry Creek received 14.1 gpm from SBA19, runoff from the access road, and an estimated 10 gpm from ponded water, (SBA20) which indirectly entered the stream. In this reach, a NPS gain in flow of 37.7 gpm was calculated. Another NPS gain in flow of 50.4 gpm was observed in the reach across Cabin Creek (SBA18 to SBA16). Above the confluence of Hoodoo Gulch (SBA10), and below the confluence with Orifino Gulch (SBA11), a NPS gain of 264.3 gpm in the flow of Strawberry Creek was identified. However, this may have been due to the inability to accurately measure the flow at SBA11. At the confluence of Hoodoo Gulch (SBA9), on Strawberry Creek between SBA10 and SBA8, a NPS loss in flow of 86.8 gpm was calculated. Immediately upstream of Bear Butte Creek, the flow measured at the confluence of Strawberry Creek at SBA3 was 905 gpm. Above and below the confluence in Bear Butte Creek, the measured flow was 6,218 gpm and 6,649 gpm, respectively, amounting to an unexplained flow loss of 474 gpm in Bear Butte Creek.

ent

nd Figures 4 thorough 6 present the flows measured in Strawberry low-flow sampling event. Many of the locations previously sampled erry Creek were dry during the low-flow sampling event. Sample SBB17, SBB15 and SBB10 at the headwaters of Strawberry Creek he low-flow sampling event. Tributary flows from seeps SBB19 and re sampled during the high-flow event were also dry.

sample locations were added within the headwaters of Strawberry location was the flow from a seep (SBB16A) between Pond A and pstream of SBB16. The second site represented a sample collected ter in Pond B above the CMP inlet (SBB15A).

e discharge was occurring from Pond B into the CMP inlet. West of nd process plant, the natural drainages (SBB21 and SBB20) were dry. adient of Pond C, the natural drainage (SBB14) and the seep (SBB12) oad were also dry. Although the French drain appeared to be dry, a eep (SBB12A) flowing at 2.3 gpm to Pond C was exposed near the rock comprising the west side of the French drain. The entire xposed in Pond C, therefore no water was entering the CMP from

erminates immediately below SBB10, east of the mine road and below was observed from the outlet of the CMP. An excavated trench was outlet of the CMP to immediately above Pond E. The trench was ated to expose the CMP for removal. This trench conveyed the flow eek. A ditch remains in place of the CMP which extends above and de of the trench. Several seeps emerged from the trench walls and o distinct drainages which merged at SBB8. Within the trench, one oducing approximately 1.2 gpm emerged from the east trench wall

a flow of 1.7 gpm was
lge of the CMP ditch, a
al 11.5 gpm flow was
iding a total flow of 15.6

esented the initiation of
ources of flow directly
BB10B (which includes
evious location of Pond
was calculated between
rred in the reach of the
f this NPS flow may be
SBB4A, which could not
ne flow measured in the

6.8 gpm from the outlet
to above Cabin Gulch
below the Orifino Mine
Additionally, a relatively
the reach of the creek
v Boomer Gulch (SBA4)
27.3 was also indicated

TABLE 2
FLOWS MEASURED DURING HIGH-FLOW EVENT

SBC	Primary Trib.	Secondary Trib.	SBC Flow (gpm)	Trib. Flow (gpm)	Trib. Flow (gpm)	GAIN(+) LOSS(-) (gpm)	REMARKS
SBB18			11.0				
	SBB19			1.0			
SBB17			14.0			+2.0	
	SBB16			6.7			
SBB15			26.4			+5.7	CMP Inlet
		SBB21			9.9		
		SBB20			12.0		
		SBB14			22.3	+0.4	
		SBB13			18.8		French drain
		SBB12			71.5		
	[2]SBB11			20			Pond C
SBB10			96.9			+50.5	
		SBB9			6.1		
		SBB7			10.4		
		SBB6			27.4		
		SBB8			31.0	-12.9	
	[2]SBB5			45		+14.0	Pond D
		SBB4			1.5		
	SBB3			118.8			
	SBB2			14.2			CMP Outlet
SBB1			182.6			+39.2	

TABLE 2
FLOWS MEASURED DURING HIGH-FLOW EVENT

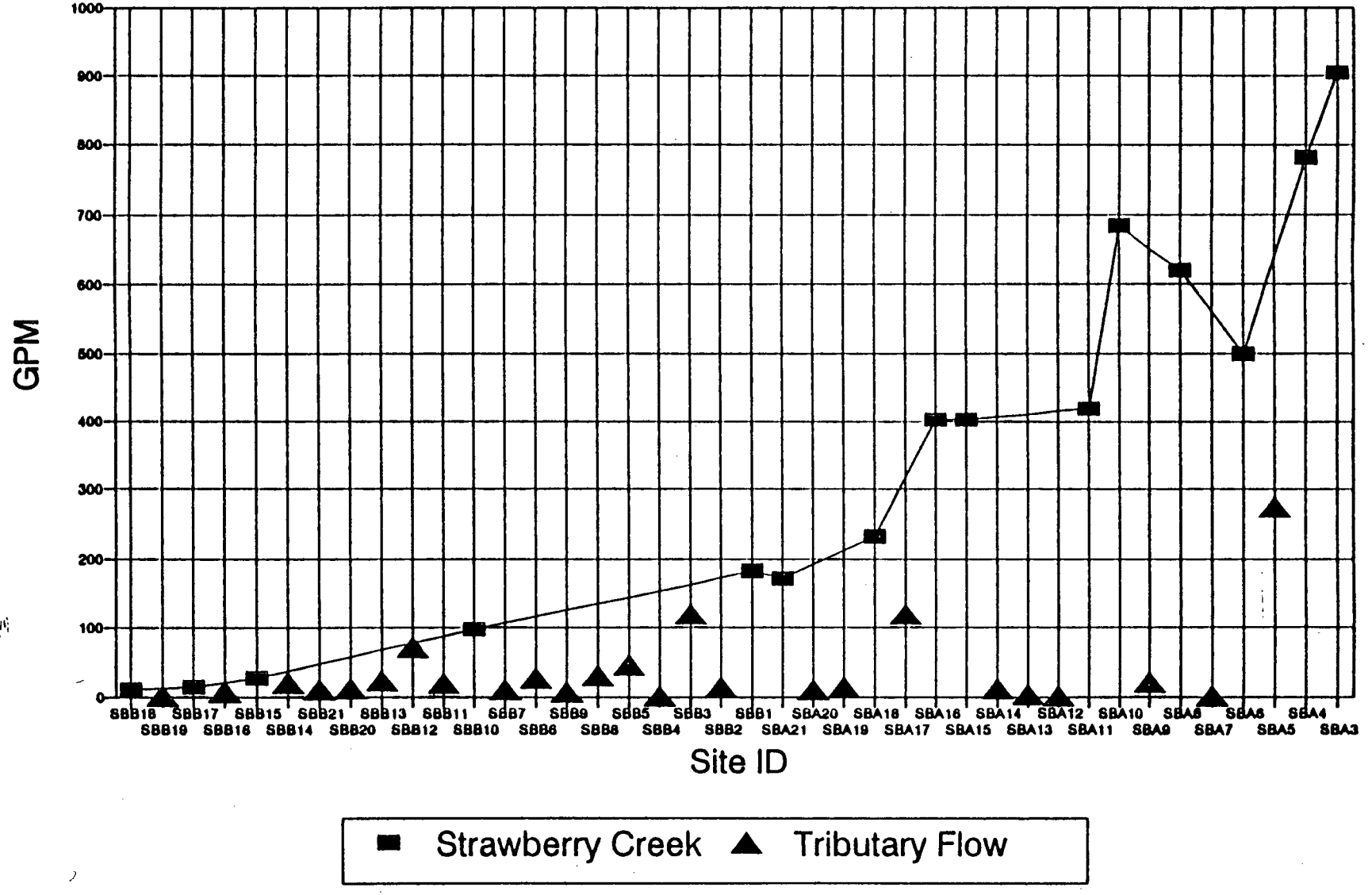
SBC	Primary Trib.	Secondary Trib.	SBC Flow (gpm)	Trib. Flow (gpm)	Trib. Flow (gpm)	GAIN(+) LOSS(-) (gpm)	REMARKS
SBB1			182.6				
SBA21			171.0			-11.6	
	SBA20			10.0			
	SBA19			14.1			
SBA18			232.8			+37.7	
	SBA17			118.8			Cabin
SBA16			402.0			+50.4	
SBA15			402.0			0	
	SBA14			12.2			Orifino
	SBA13			2.7			Orifino
	SBA12			1.8			Orifino
SBA11			419.7			+1.0	
SBA10			684.0			+264.3	
	SBA9			21.8			Hoodo
SBA8			619			-86.8	
	SBA7			1.0			Spring
SBA6			500.0			-120.0	
	SBA5			274.4			Boomer
SBA4			781.0			+6.6	
SBA3			905.0			+124	
[1]SBA2			6218.0				Bear Butte
[1]SBA1			6649.0			-474	Bear Butte

[1] Sites SBA1 and SBA2 are on Bear Butte Creek, downstream and upstream of Strawberry Creek.
[2] Flows from the ponds into the standpipes were visually estimated.

TABLE 3
FLOWS MEASURED DURING LOW-FLOW EVENT

SBC	Primary Trib.	Secondary Trib.	SBC Flow (gpm)	Trib. Flow (gpm)	Trib. Flow (gpm)	GAIN(+) LOSS(-) (gpm)	REMARKS
SBB10A			4.1				
SBB10B			15.6			+11.5	
		SBB9B			1.2		
		SBB9A			1.7		
	SBB9			4.6		+1.7	
SBB8			15.2			-5.0	
SBB5[1]			22.3			+7.1	[1]Pond D
	SBB4A			1.1			
SBB1			28.0			+4.6	
SBA21A			29.0			+1.0	Pond E
SBA21			22.2			-6.8	
SBA18			15.4			-6.8	
	SBA17			15.4			Cabin
SBA16			27.4			-3.4	
SBA15			32.1			+4.7	
	SBA14			8.0			Orifino
	SBA13			0.1			Orifino
	SBA12			0.1			Orifino
SBA11			42.8			+2.5	
SBA10			79.8			+37.0	
	SBA9			3.1			Hoodoo
SBA8			83.8			+0.9	
	SBA7			0.5			Spring
SBA6			68.8			-15.5	
	SBA5			41.0			Boomer
SBA4			179.6			+69.8	
SBA3			206.9			+27.3	
[2]SBA2			849				Bear Butte
[2]SBA1			1052			-3.9	Bear Butte

[1] Pond D was removed prior to the low flow event.
[2] Sites SBA1 and SBA2 are on Bear Butte Creek, downstream and upstream of Strawberry Creek.

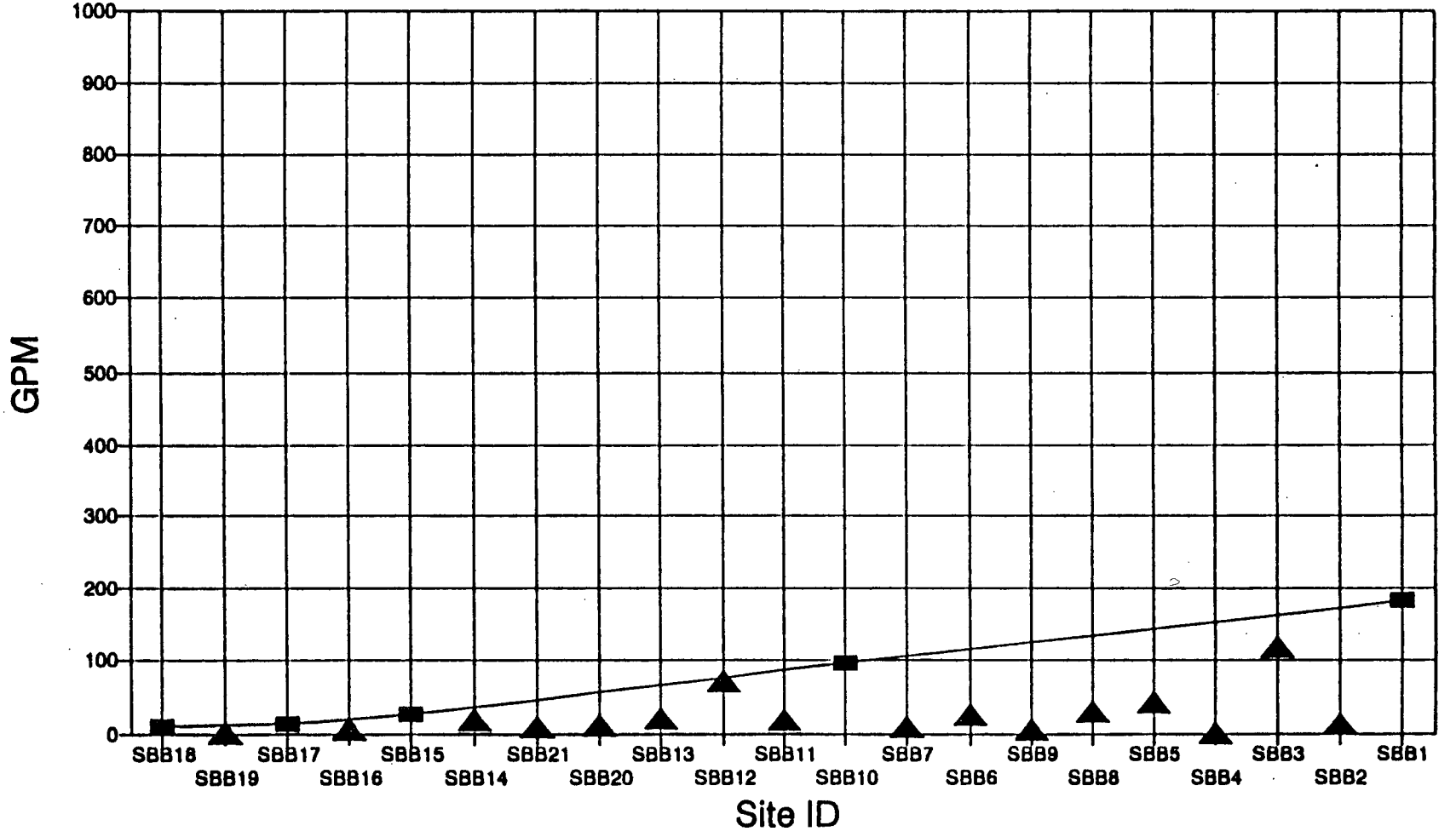


WATER WASTE & LAND INC.

FIGURE 1
FLOW IN SEGMENT A AND B
HIGH FLOW

Date: SEPT 1993

Project: 232

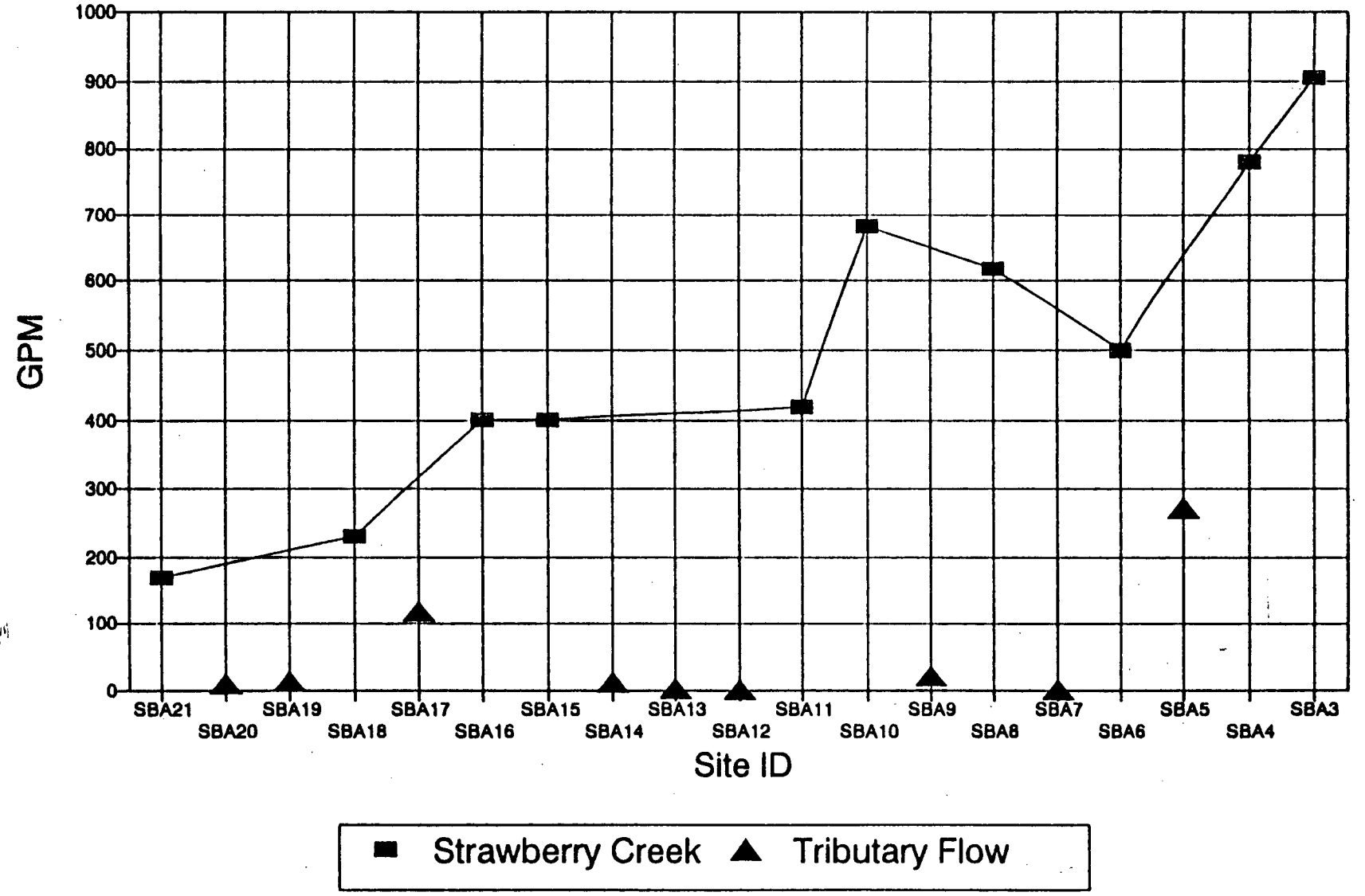


WATER WASTE & LAND INC.

FIGURE 2
FLOW IN SEGMENT B
HIGH FLOW

Date: SEPT 1993

Project: 232

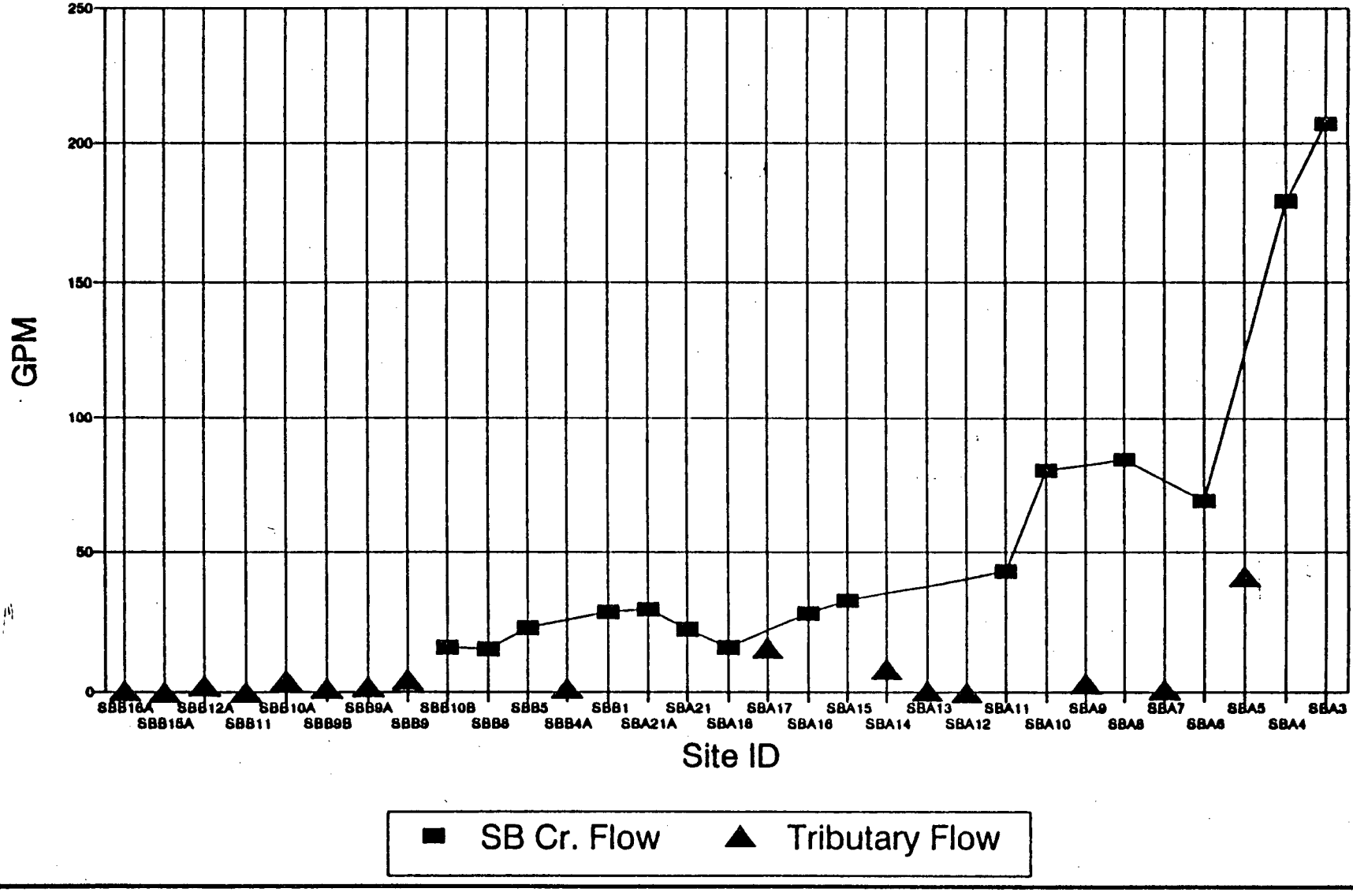


WATER WASTE & LAND INC.

FIGURE 3
FLOW IN SEGMENT A
HIGH FLOW

Date: SEPT 1993

Project: 232

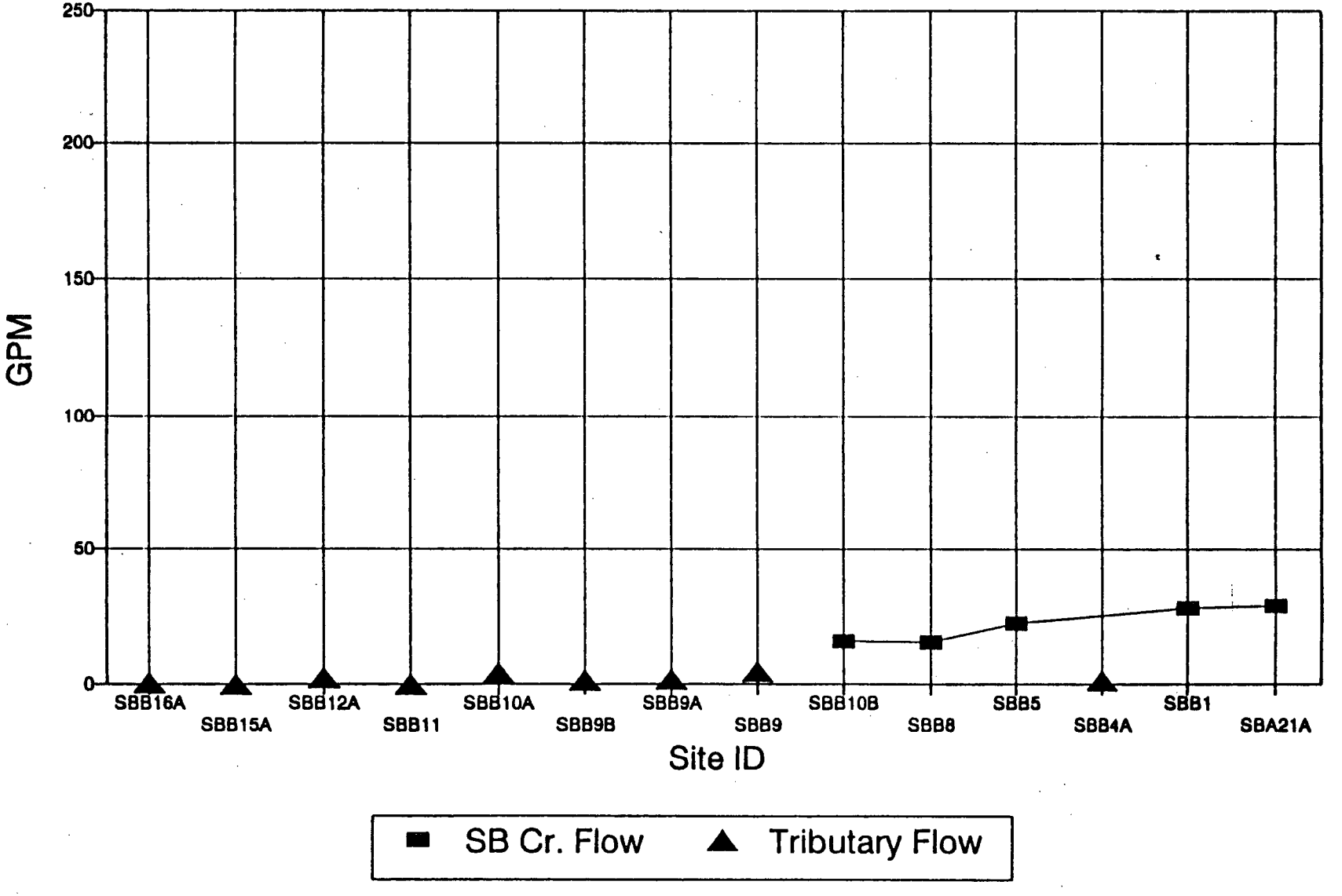


WATER WASTE & LAND INC.

FIGURE 4
FLOW IN SEGMENT A AND B
LOW FLOW

Date: SEPT 1993

Project: 232

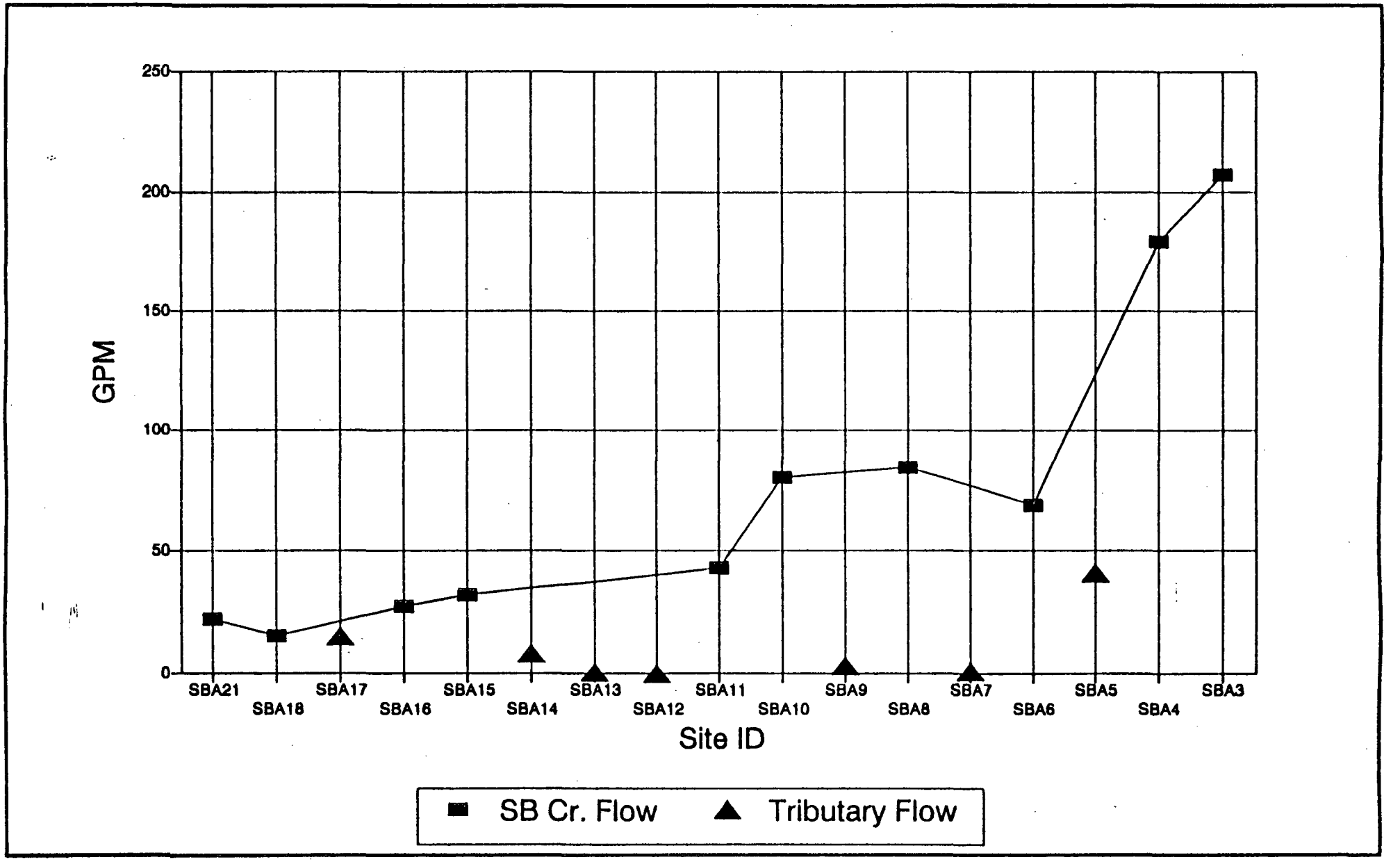


WATER WASTE & LAND INC.

FIGURE 5
FLOW IN SEGMENT B
LOW FLOW

Date: SEPT 1993

Project: 232



WATER WASTE & LAND INC.

FIGURE 6
FLOW IN SEGMENT A
LOW FLOW

Date: SEPT 1993

Project: 232

4.0 CONCENTRATIONS

The water quality samples collected during the high-flow and low-flow sampling events were analyzed for the parameters shown in Table 4. The metal constituents were analyzed on both a total recoverable and dissolved basis. The results of the laboratory analyses are presented in Appendix A.

The concentrations were compared to the performance standard concentrations listed by the U.S. Environmental Protection Agency (EPA), Region VIII for Strawberry Creek in "Findings of Violation and Order for Compliance" pertaining to the Gilt Edge Mine dated November 24, 1993. The following performance standards for total recoverable metals and total suspended solids (TSS) were used to compare to the measured concentrations:

Parameter	Daily Maximum (mg/l)	Monthly Average (mg/l)
Copper	0.3	0.15
Zinc	1.5	0.75
Lead	0.6	0.3
Mercury	0.002	0.001
Cadmium	0.10	0.05
TSS	30	20

The above standards were compared to all sampling locations including those samples not collected directly from Strawberry Creek.

4.1 High-Flow Event

Lead and cadmium concentrations were less than both standards at all sampling locations. Mercury and selenium concentrations were below laboratory detection limits at all sampling locations and therefore, less than the respective standards. Concentrations of copper and zinc frequently exceeded both the daily maximum and monthly average performance standards.

Copper concentrations exceeded the above standards essentially throughout Strawberry Creek, except for the reaches of the creek above the mine. Total recoverable and dissolved copper concentrations were generally higher in the lower segment of Strawberry Creek. In Strawberry Creek, copper concentrations were the highest in the reach immediately below Pond E to above the confluence with Cabin Creek, and exhibited a decreasing trend in a downstream direction. The total recoverable copper concentration in Boomer Gulch exceeded the monthly average standard. Copper concentrations were also elevated in Bear Butte Creek downstream of Strawberry Creek.

Zinc concentrations exhibited similar trends as copper concentrations. Zinc concentrations exceeded the above standards essentially throughout Strawberry Creek, from immediately above Pond C to upstream of Boomer Gulch. Several inflows to Strawberry Creek also exceeded the above standards including drainages adjacent to the relic tailings and the access road drainage below Pond E. In general, total recoverable and dissolved zinc concentrations were highest in Strawberry Creek in the reach below Pond E to above the confluence with Cabin Creek, and exhibited a decreasing trend in a downstream direction.

Concentrations of TSS also exceeded the above standards, although, primarily in the lower reaches of Strawberry Creek. In upper Strawberry Creek, two seeps flowing into the creek, SBB19 and SBB16, exceeded the TSS standards with concentrations of 50 mg/L and 40 mg/L, respectively. In lower Strawberry Creek, from Pond E to the confluence with Bear Butte Creek, TSS concentrations in the creek ranged from 65 mg/l to 25 mg/l.

Flow Event

ncentrations of selenium and mercury were below laboratory detection limits
les collected during the low-flow sampling event in Strawberry Creek and its
. Lead concentrations were also below detection limits at all locations except
nch drain seep (SBB12A), the CMP seep (SBB10A) and in both pit samples
d SBA23). None of the lead concentrations detected at the above locations
e EPA performance standards. Cadmium exceeded the monthly standards
rry Creek at SBA18 and seep flows SBB9A and SBB4A.

remaining metals of concern include zinc, iron, copper and aluminum, plus
ended solids. Peak concentrations of these metals generally occurred in
Creek immediately upstream of Cabin Creek (SBA18) with the exception of
exhibited the highest concentration in the creek immediately downstream of
ek (SBA16). Concentrations of these metals decreased in a downstream
owards the confluence with Bear Butte Creek (SBA3). In lower Strawberry
c concentrations decreased to values less than the performance standards
m of Boomer Gulch (SBA4). At the sample location in Bear Butte Creek
ownstream of Strawberry Creek, the total recoverable copper concentration
g/l slightly exceeded the 0.15 mg/l monthly average standard.

le daily maximum or monthly average standards were not set by the EPA for
uminum, trends in concentrations for these two metals were generally similar
ds observed for copper and zinc. Total Suspended Solids concentrations
e EPA performance standards in lower Strawberry Creek from below Cabin
he confluence with Bear Butte Creek. The peak TSS concentration of 65
rred in the creek at the sampling location below Cabin Creek (SBA16). Total
d solids concentrations in the creek decreased downstream to the confluence
Butte Creek.

t each sampling
rations resulting
d, expressed in
lated as follows,

tabular listing in
le and dissolved
y with respect to
ncentrations and
trawberry Creek.
able metal loads,
high-flow event.

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at different times
loads caused by
w-flow sampling

also provided in
subtracting the

upstream creek load and the tributary inflow loads within the reach from the downstream creek load. These calculated gains or losses in loading from the upstream to downstream sampling stations on the creek are referred to as non-point sources (NPS). A negative NPS value indicates a loss of load in the creek across the reach, while a positive NPS value indicates an unaccounted gain in loading. Potential sources of unaccounted gains or losses in load within a reach include ground water discharge or recharge, geochemical precipitation of metals, or sorption of metals from sediments into the water column. Errors in flow measurements or laboratory analyses may also be attributed as a NPS.

Total recoverable metal loads for arsenic, cadmium, copper, aluminum, iron, and zinc during the high-flow and low-flow sampling events are presented and discussed in the following sections. Since concentrations of mercury, selenium, silver, and lead were less than laboratory detection limits at all or most of the sampling locations, these parameters were not included in the loading balance. Field pH values are graphically shown on Figures 7 and 8 for the low-flow event and on Figures 9 and 10 for the high-flow event. Figures 11 through 16 and Figures 17 through 20 graphically depict the total recoverable metal loads for the high-flow event and low-flow event, respectively. The plots of the metal loads are split into stream segments A and B to avoid congestion of the data points. However, the scale of the plots is the same from segment A to segment B for each metal and sampling event. The continuous line on the figures represents the calculated load in Strawberry Creek. Symbols not on the line represent loads associated with inflow sources, such as tributaries and seeps. Samples collected at sites SBB2 and SBB3 in Segment B during the high-flow event do not represent the total flow in Strawberry Creek, and therefore the metal loads at these sites are shown as tributaries on Figures 11 through 16.

5.1 High-Flow Event

During the high-flow sampling event, concentrations of aluminum, iron, copper, manganese, and zinc were detected at most of the sampling locations in Strawberry Creek. Arsenic and cadmium concentrations were detected in the lower segment of the creek, but were typically less than laboratory detection in the upper segment of the creek. Concentrations of mercury, selenium, silver, and lead were less than laboratory detection at all or most of the sampling locations, therefore, loads for these parameters were not evaluated.

As discussed previously, the total gain in load calculated for a given reach of the creek is comprised of the known loading from a point source and the loading from a non-point source. The contribution of a point or non-point source load was evaluated relative to the total load or other sources of loading. Table 5 provides a summary of the total increase in load, point source loads and non-point source loads for selected metals and flow for Segment A and Segment B of Strawberry Creek. Again, Segment A represents the lower reach of creek below the mine, while Segment B represents the upper reach of the creek across the mine area.

As shown in Table 5, the net increase in load observed across Segment A was typically significantly greater than that observed for Segment B. In other words, the majority of loading in Strawberry Creek was observed in Segment A, the lower reach of the creek below the mine. In addition, the relative contribution from non-point sources to the total increase in load was typically greater in Segment A than in Segment B. For example, the total increase in aluminum loading observed in Segment A was 50.5 lbs/day compared to 17.2 lbs/day for Segment B. In Segment A, the point sources accounted for only about 5 percent of the total load increase observed in Segment A, while the point sources in Segment B accounted for about 65 percent of the total increase in load observed in Segment B. The relative contribution of loading

from point sources and non-point sources, and the magnitude of the load increase observed in each segment varies for each metal.

5.1.1 Identified Increases in Loading (Point Source)

Several locations in upper Strawberry Creek were identified as distinct sources of loading. However, the magnitude of the loads contributed from these point sources were relatively small in comparison to loadings observed in lower Strawberry Creek. In upper Strawberry Creek, three sources of flow enter Pond C; SBB12, SBB13 and SBB14. SBB12 is a seep which emerges from the west embankment of the mine road, enters a culvert and discharges into the pond. Dissolved zinc, manganese and total aluminum loadings were relatively higher from the SBB12 seep as compared to the other tributary loads (SBB13 and SBB14) and Pond C (SBB11). Considering the balance of flows entering Pond C, SBB12 contributes the majority of the metal loading relative to the other sources.

The drainage east of the CMP between SBB9 and Pond D (SBB5) flows in contact with relic tailings. Values of pH progressively decrease from upstream to downstream. Net increases in aluminum and iron loads, and to a lesser extent copper and manganese loads, were observed in this reach. Inflows from the corrugated plastic pipe (SBB7) and the culvert from the east side of the mine road (SBB6) discharge between the CMP and the mine road embankment. Gains in loading between SBB9 and SBB5 are believed to result from contact with relic tailings in the channel and beneath the CMP.

In lower Strawberry Creek, point source inflows to the creek occur primarily from natural tributaries. These sources of inflow include: a seep below Pond E (SBA20), runoff from the mine access road (SBA19), Cabin Creek (SBA17), seeps from the Orifino mine (SBA14, SBA13, and SBA12), Hoodo Gulch (SBA9), a spring below Hoodo Gulch (SBA7), and Boomer Gulch (SBA5). Generally, the loads associated with these

point sources are small in comparison to the load in Strawberry Creek. Relative to the above point sources, Hoodo Gulch contributes the largest point source loading for most metals.

As discussed previously, metal concentrations are typically highest in Strawberry Creek upstream of Cabin Creek (SBA18), and decrease in the downstream direction. Loads for most metals in Strawberry Creek tend to peak at SBA10, above Hoodo Gulch, and decrease in a downstream direction. The inflows of relatively high pH waters from the natural tributaries are believed to result in account for the decreasing trends in concentrations and loads in lower Strawberry Creek. The inflows are believed to result in the geochemical precipitation of iron and aluminum, and to some extent, the co-precipitation of other metals. The precipitation of the metals would be dependent on the respective geochemical behavior of each metal. The total recoverable iron concentrations and loads are significantly greater than the dissolved iron concentrations and loads in lower Strawberry Creek. To a lessor degree, a similar trend was observed for total recoverable and dissolved aluminum loads. The higher total recoverable iron loads are believed to be a function of the suspended solids.

5.1.2 Undefined Sources of Loading (Non-Point Sources)

As discussed previously, non-point sources (NPS) contribute a portion of the loading observed in the creek. These loadings are believed to be associated with dissolution of metals from relic tailings or sediments and ground water contributions. It is emphasized that the NPS gains or losses may also result from errors in flow measurement or laboratory analyses. For example, the inability to accurately visually estimate the flows from Ponds C and D into the CMP standpipes, probably results in a portion of the NPS loadings observed in these reaches of the creek.

One of the largest NPS gains in metal loads in lower Strawberry Creek was observed in the reach from the sampling site below the CMP outlet to the sampling site

below Pond E (SBB1 to SBA21). Relatively large increases in aluminum, copper, iron and arsenic loads, and to a lessor extent manganese and zinc loads, were observed in this reach. The largest increase in dissolved and total recoverable iron was identified in this reach. The dissolved iron load was highest in Strawberry Creek at SBA21. The total recoverable iron load was highest in Strawberry Creek at the next downstream station SBA18. In addition, the largest gains in total recoverable loads of arsenic and copper were observed within this reach. The highest concentrations of most dissolved and total recoverable metals in Strawberry Creek were also observed at either SBA21 or SBA18. In addition, the pH of 3.28 and 3.21 measured at SBA21 and SBA18, respectively, were the lowest recorded in Strawberry Creek. Potential sources of the NPS gain in loading include contact with relic tailings present within this reach or ground water inflow. Due to the negligible change in flow between SBB1 and SBA21, the significant increase in loading is judged to result from contact with relic tailings which are present within the reach.

An additional significant gain in NPS loading was observed in lower Strawberry Creek downstream of the Orifino mine to upstream of Hoodo Gulch, from SBA11 to SBA10. In this reach an unidentified gain in flow of 264.3 gpm was also observed. Loads for most metals in the creek typically reached maximum values at SBA10. The largest NPS gains in sulfate, potassium, sodium, and magnesium loading, and dissolved and total recoverable loads of cadmium and manganese were observed across this reach. The NPS gain in loading within this reach may be the result of a flow measurement error, however, a similar increase in flow and loads was observed in this reach during the low-flow event. Given the increase in flow and the increase in loads for the major ions, the source of the loading is believed to result from ground water inflow.

5.1.3 Load Losses

In the reach from SBA10 to SBA6 in lower Strawberry Creek, a net flow loss of 184 gpm and corresponding decreases in iron, aluminum, zinc, and copper loads were observed. A transition in the stream bed from tailings or bedrock to alluvium may be indicative of ground water recharge as flow infiltrates the alluvium. As previously discussed, the decrease in metal concentrations and loads may also be the result of geochemical precipitation. Between SBA10 and SBA8, a flow loss of 86.8 gpm coupled with total recoverable and dissolved load decreases of 15 to 25 percent for aluminum, copper, manganese and zinc were observed. In addition, a 64 percent decrease in total recoverable iron was observed within this reach. From SBA8 to SBA6, a flow loss of 120 gpm, and a 33 to 67 percent decrease in aluminum, copper, manganese, dissolved iron, and dissolved zinc were observed. However, total recoverable iron and zinc loads increased.

5.2 Low-Flow Event

The magnitude of flows and loads were substantially less during the low-flow event as compared to the high-flow event. Most of the previous sample locations in upper Strawberry Gulch were dry during the low-flow event. Due to the relatively small magnitude of flows and decreased concentrations, metals loads were also substantially reduced. Concentrations of arsenic, cadmium, mercury, selenium, silver, and lead were less than laboratory detection at all or most of the sampling locations, therefore, loads for these parameters were not evaluated. Figures 13 and 14 graphically depict the total recoverable iron and aluminum loads for Segments B and A, respectively, for the low-flow event. Figures 17 and 18 present the total recoverable copper and zinc loads for Segments B and A, respectively.

The proportion of the non-point source loads to the point source loads was greater during the low-flow event as compared to the high-flow event. For example,

unted for approximately 76 and 62 percent of the total flow
egments B and A, respectively, during the low-flow event. In
ces accounted for approximately 57 and 38 percent of the total
n Segments B and A, respectively, during the high-flow event.
nt source flow is not surprising, given the decreased surface
the low-flow event. The increase in the proportion of non-point
the total increase in flow is due to the higher proportion of
ative to runoff. Every effort was made to identify sources
n contributed loads to Strawberry Creek. Contact with stream
o contribute to the loading between sample locations.

s

rry Creek, flow began in the creek as seepage emerged in the
stream of the relocated outlet of the CMP. Several of these
to relic tailings located upstream of the previous location of
the load increases can be attributed to the contributions from
o establish the initial stream flow at SBB8. Decreasing pH
r contacted the relic tailings. Seepage from the upper section
elow the end of the CMP exhibited pH values ranging from 4.0
eased to about pH 3.3 as the flow passed through the lower
D. Most of the increase in observed loading from below the
am of Pond E appeared to result from seepage in contact with
ations sampled in upper Strawberry Creek do not directly enter
se locations include two seeps (SBB16A and SBB12A) and
B (SBB15A) and Pond C (SBB11).

-flow event, non-point source loads were observed during the
erry Creek from SBB1 to SBA21 and from SBA11 to SBA10.
SBA21 encompasses the reach of the creek from the previous

gnificant NPS gains in sulfate
aluminum and iron occurred
s/day for sulfate, 3.7 lbs/day
iin the reach. The lowest pH
ream of this reach at SBA18.
decrease in flow. Again, the
n of metals from relic tailings.

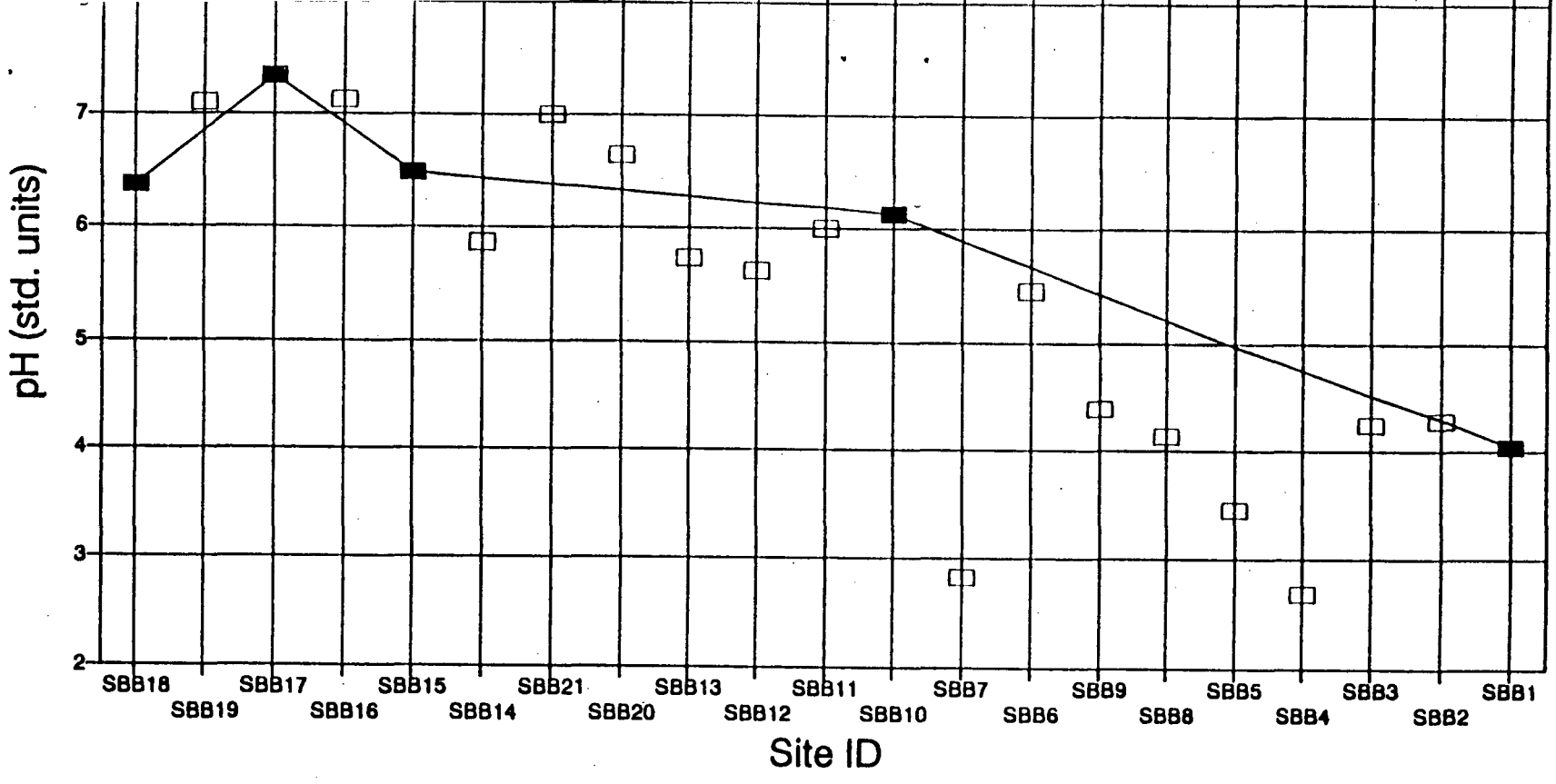
ie reach of Strawberry Creek
Gulch. Significant non-point
nd magnesium loading, and
im, copper and zinc loadings
js correspond to an increase
gh-flow event, the increase in
ı ground water inflow.

occurred in the reach from
3A6. The decrease in loads
oads within these reaches is
geochemical precipitation of
6, pH values increase. From
, the pH in Strawberry Creek

TABLE 5
POINT AND NON-POINT SOURCE LOADS DURING THE HIGH-FLOW EVENT

Parameter	Strawberry Creek Segment	Total Load Increase (lb/day)	Point Source Load (lb/day)	Non-Point Source Load (lb/day)
Aluminum	A	50.5	2.4	48.1
	B	17.2	11.3	5.9
	Total	67.7	13.7	54.0
Iron	A	58.8	1.1	57.7
	B	8.0	2.8	5.2
	Total	66.7	3.8	62.9
Copper	A	14.2	0.1	14.1
	B	1.0	0.6	0.4
	Total	15.2	0.7	14.5
Zinc	A	2.97	0.66	2.31
	B	2.82	0.68	2.14
	Total	5.79	1.34	4.45
Sulfate	A	1384	226	1158
	B	1179	685	494
	Total	2563	911	1652
Flow[1]	A	722.4	456.8	265.6
	B	171.6	74.2	97.4
	Total	894.0	531.0	363.0

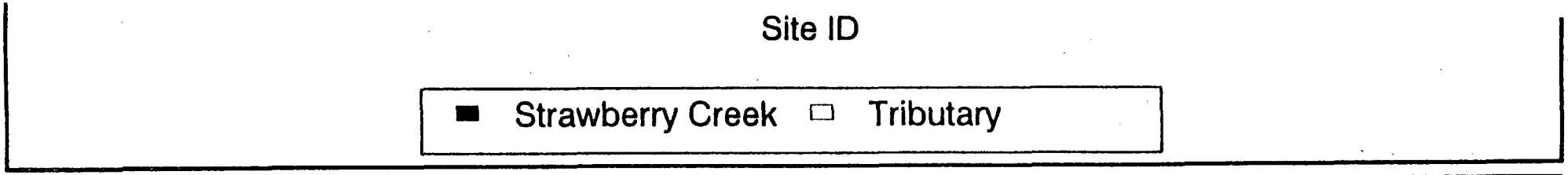
[1] Units of Flow are in gpm



WATER WASTE & LAND INC.

FIGURE 7
pH VALUES – SEGMENT B
HIGH FLOW

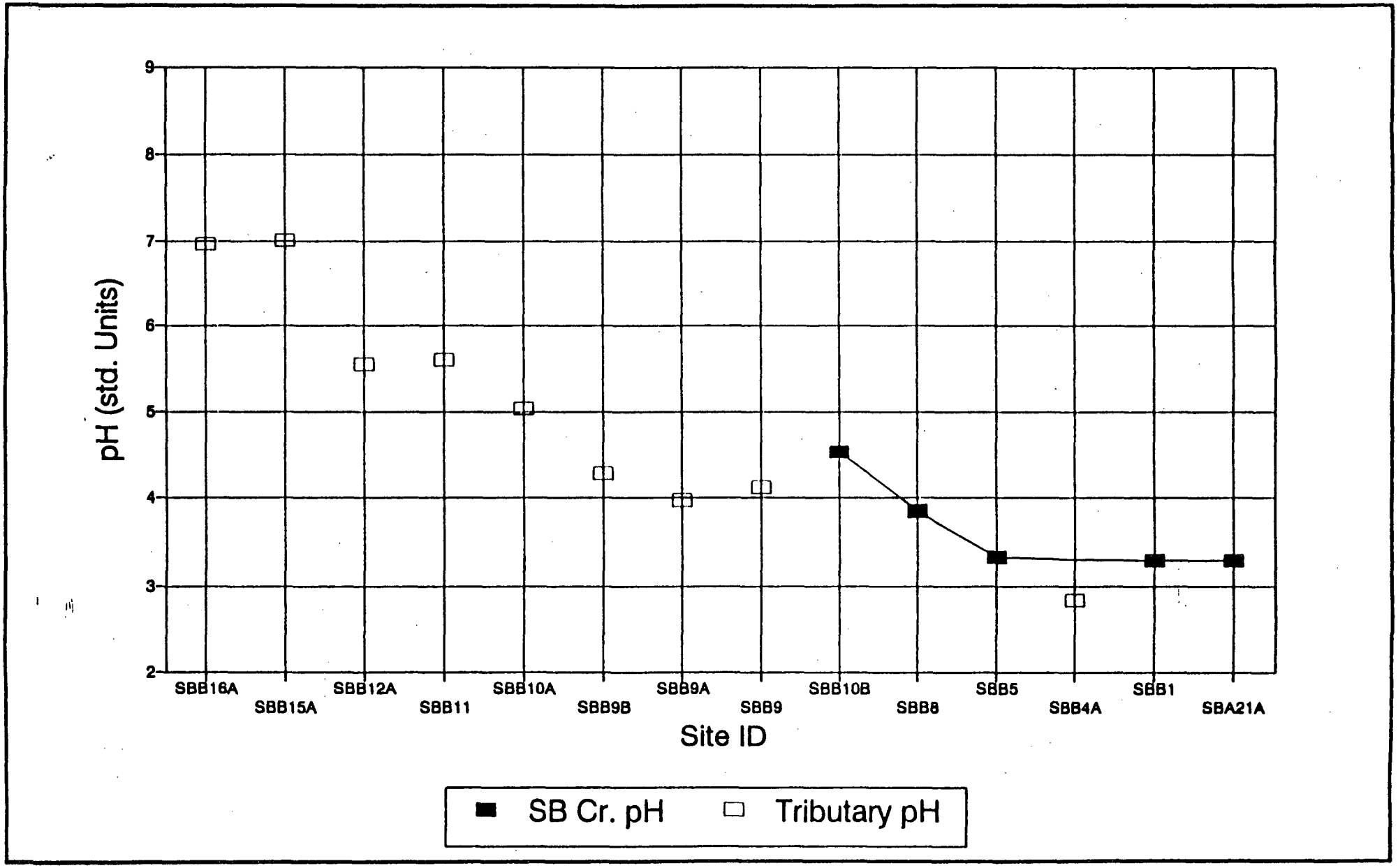
Date: SEPT 1993
Project: 232



WATER WASTE & LAND INC.

FIGURE 8
pH VALUES – SEGMENT A
HIGH FLOW

Date: SEPT 1993
Project: 232

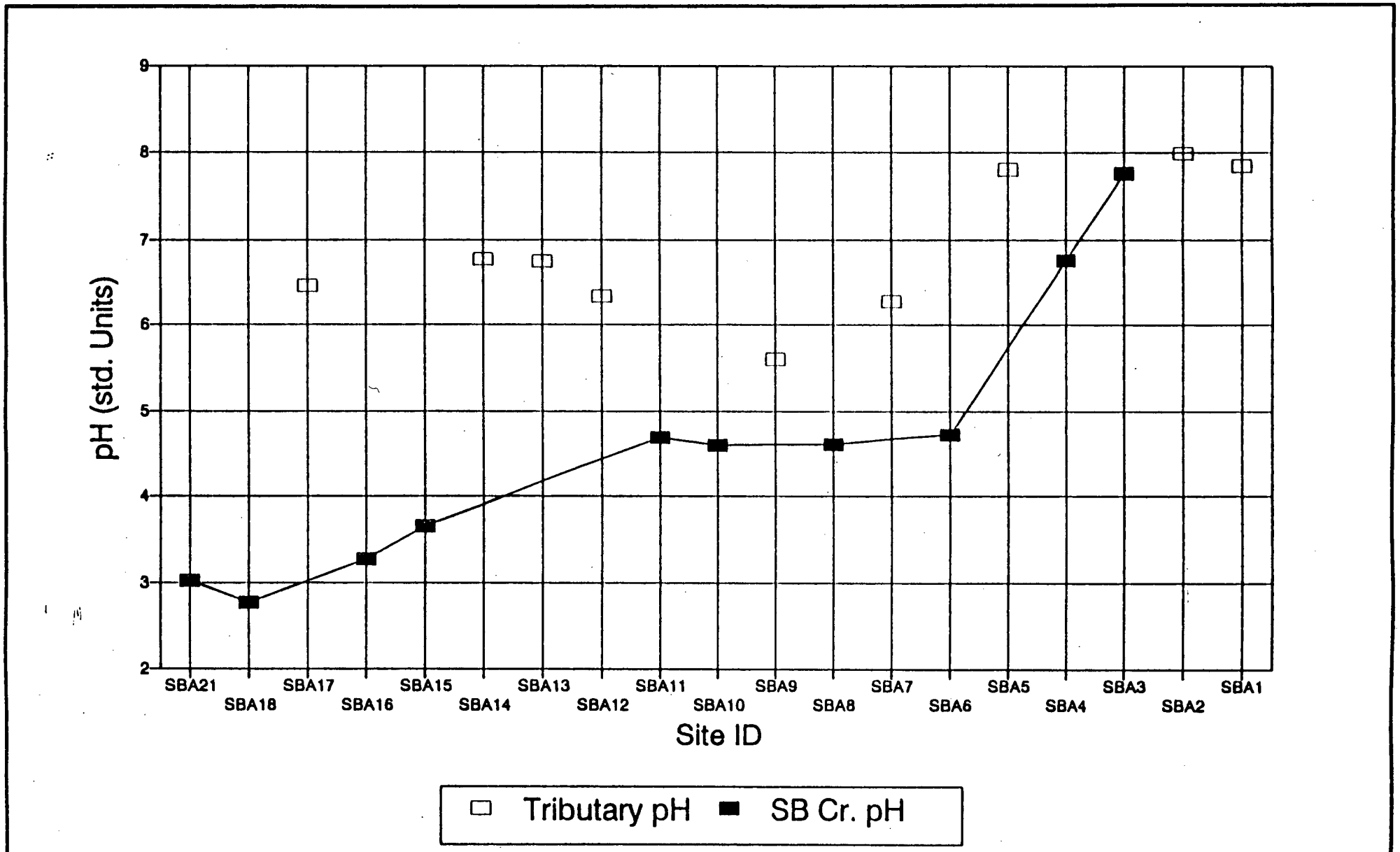


WATER WASTE & LAND INC.

FIGURE 9
pH VALUES – SEGMENT B
LOW FLOW

Date: SEPT 1993

Project: 232

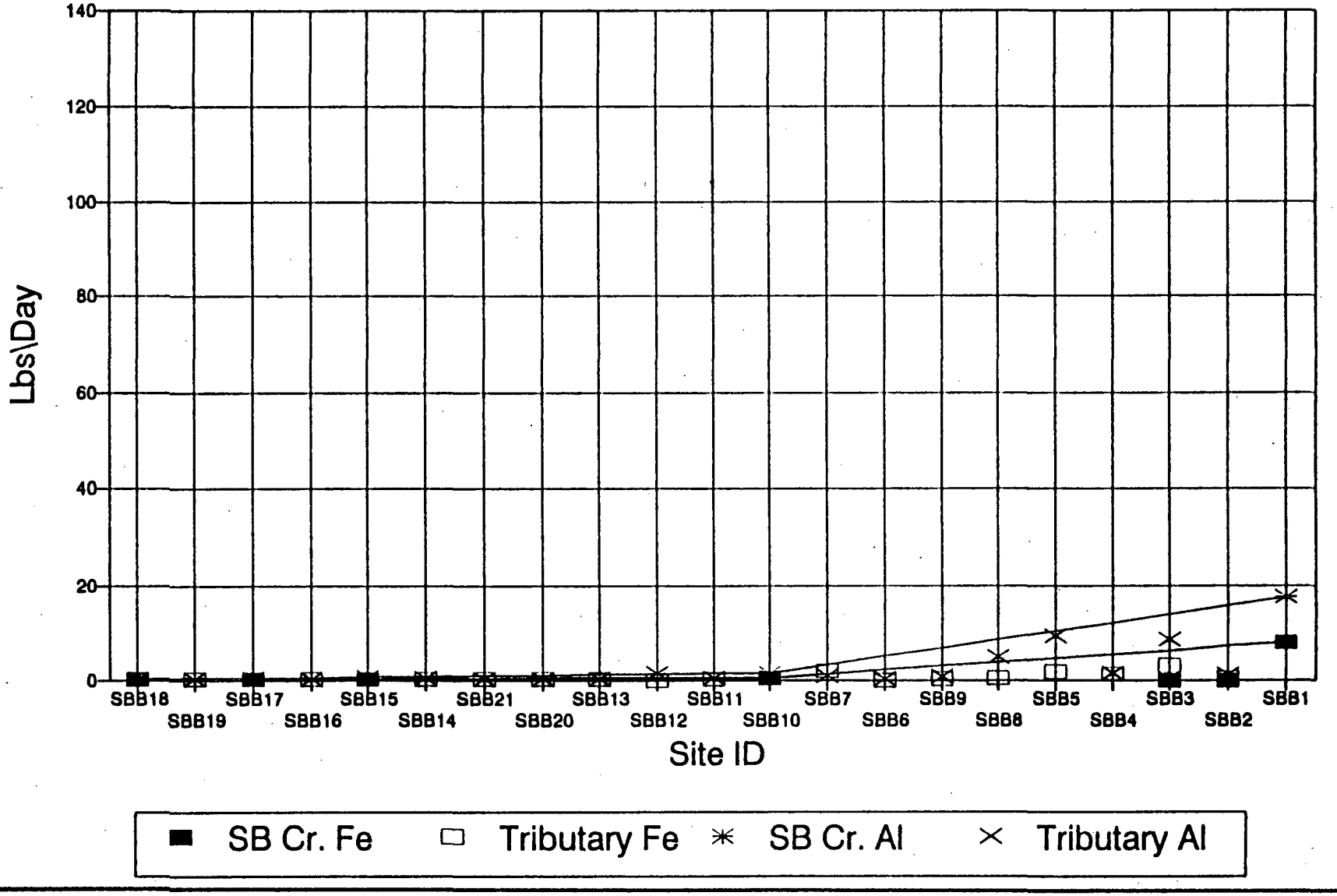


WATER WASTE & LAND INC.

FIGURE 10
pH VALUES – SEGMENT A
LOW FLOW

Date: SEPT 1993

Project: 232

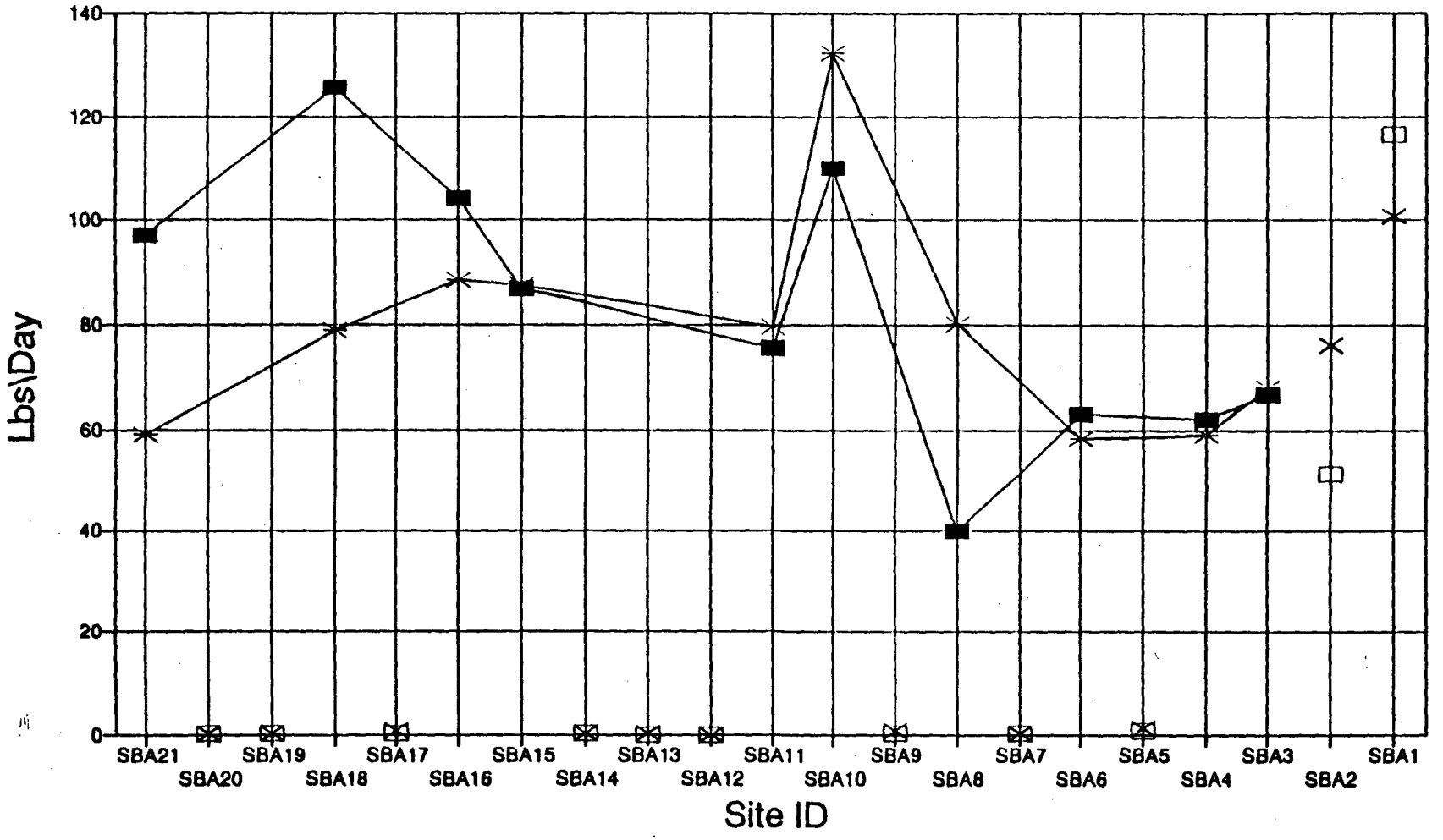


WATER WASTE & LAND INC.

FIGURE 11
ALUMINUM AND IRON LOADING – SEGMENT B
HIGH FLOW

Date: SEPT 1993

Project: 232

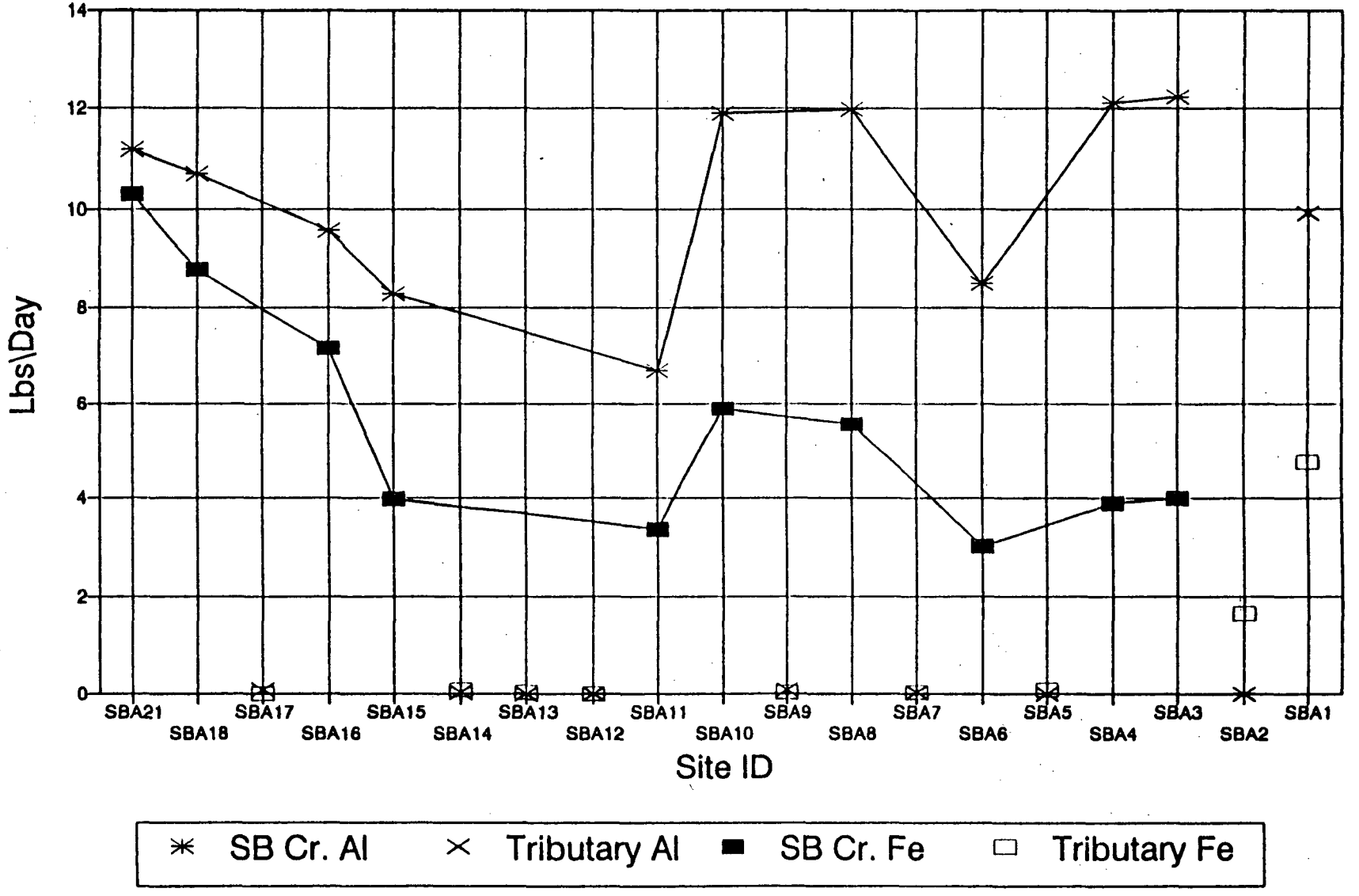


WATER WASTE & LAND INC.

FIGURE 12
ALUMINUM AND IRON LOADING – SEGMENT A
HIGH FLOW

Date: SEPT 1993

Project: 232

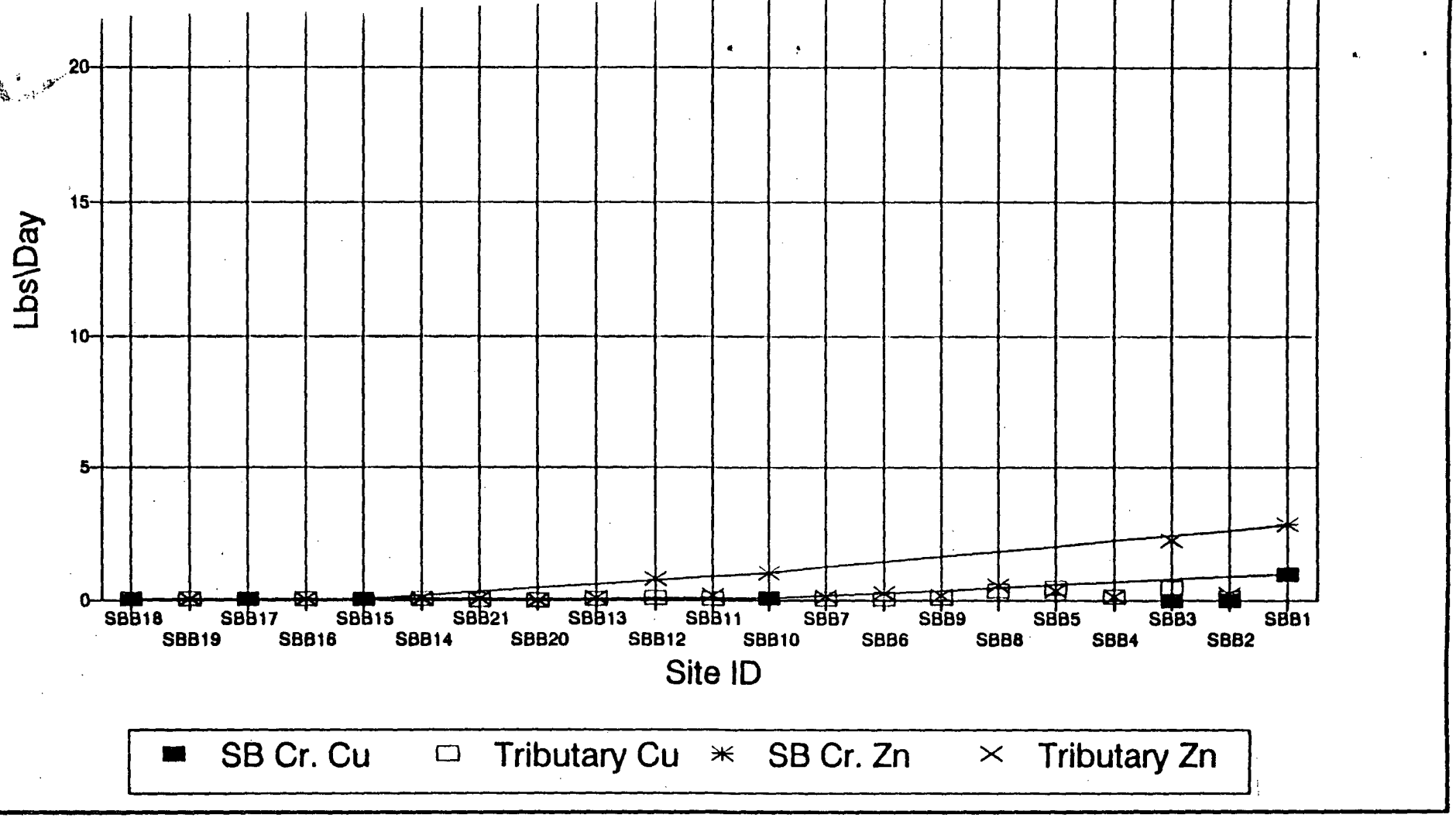


WATER WASTE & LAND INC.

FIGURE 14
ALUMINUM AND IRON LOADING – SEGMENT A
LOW FLOW

Date: SEPT 1993

Project: 232



WATER WASTE & LAND INC.

FIGURE 15
COPPER AND ZINC LOADING – SEGMENT B
HIGH FLOW

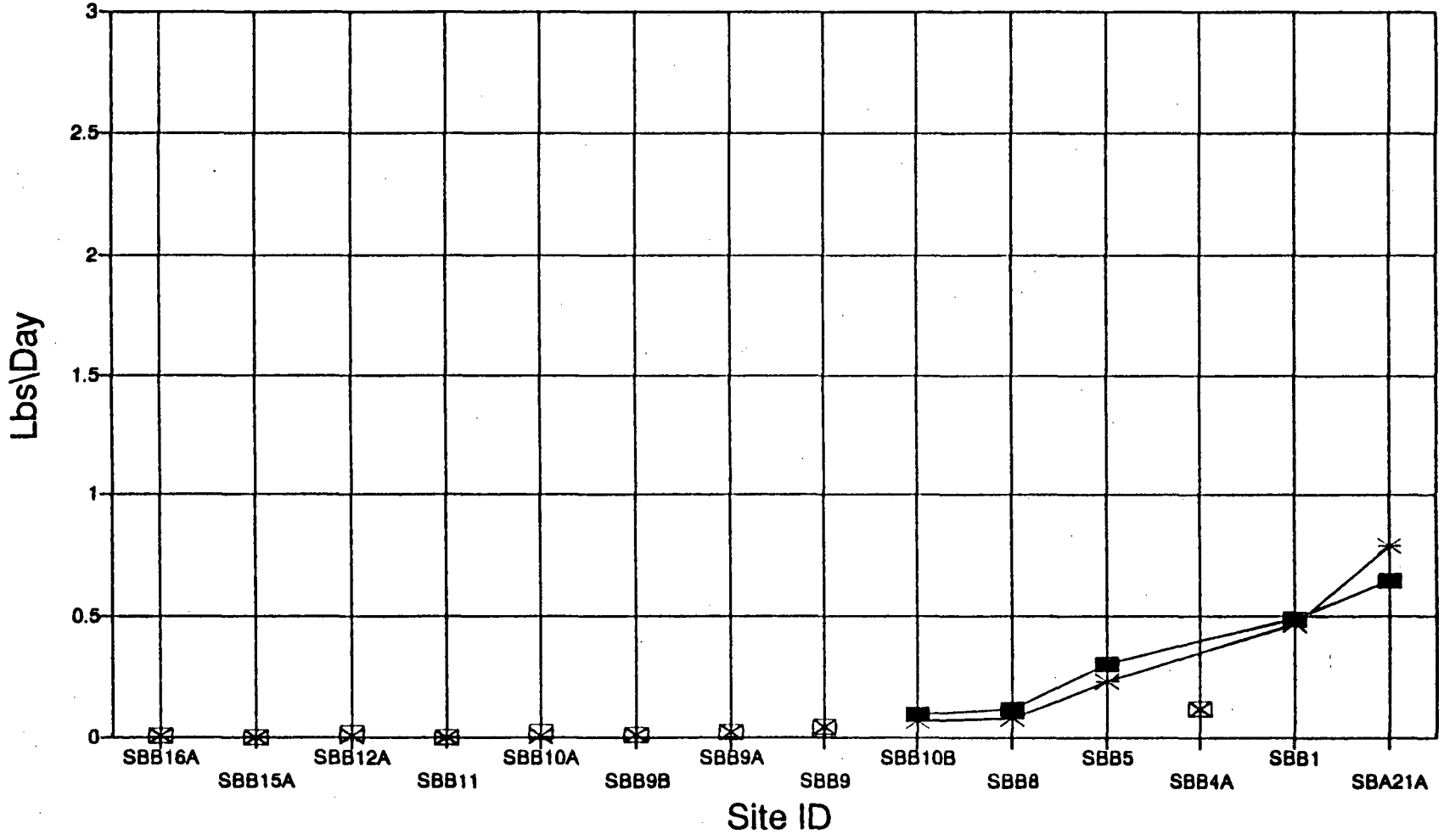
Date: SEPT 1993
Project: 232

SB Cr. Cu Tributary Cu SB Cr. Zn Tributary Zn

WATER WASTE & LAND INC.

FIGURE 16
COPPER AND ZINC LOADING – SEGMENT A
HIGH FLOW

Date: SEPT 1993
Project: 232

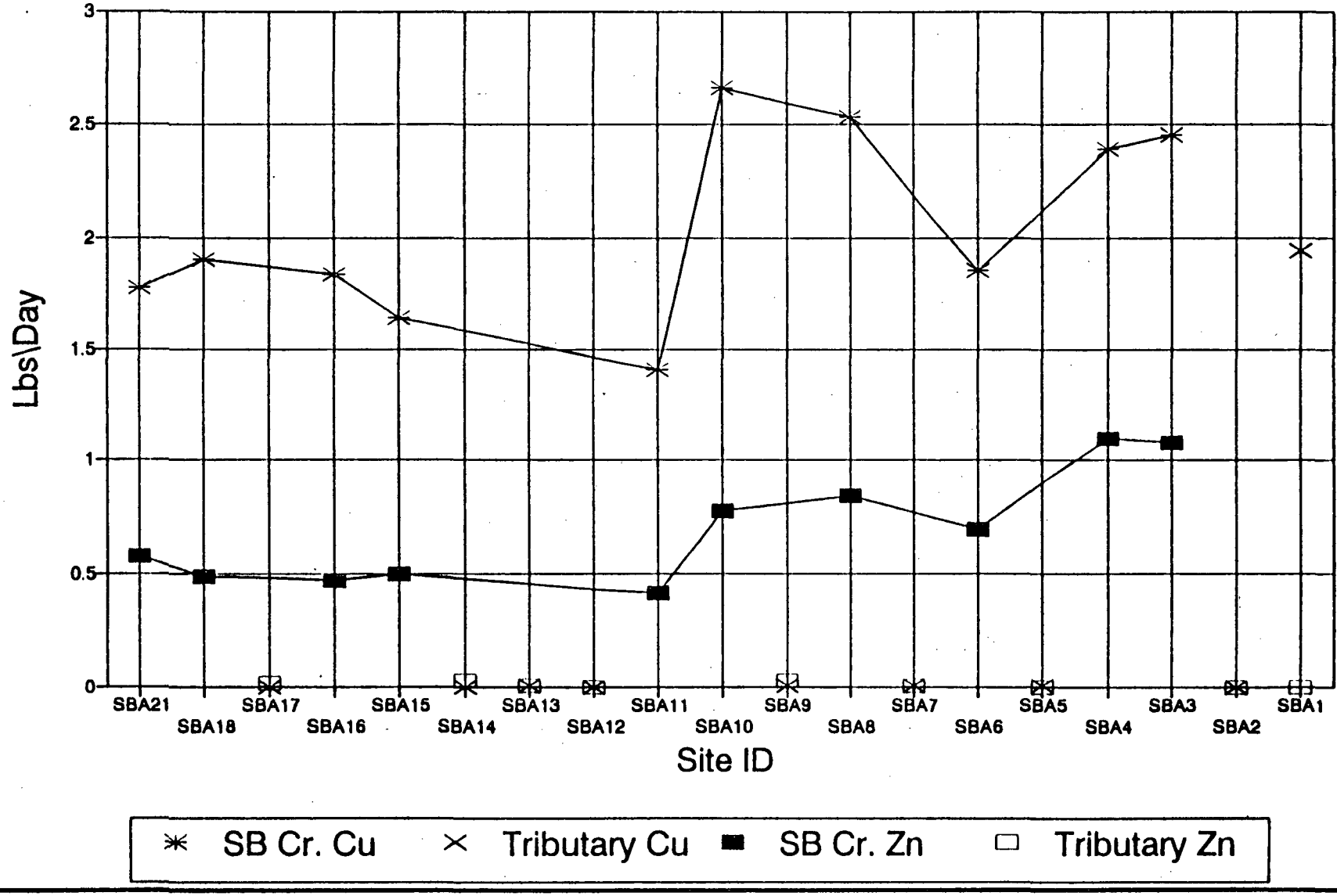


WATER WASTE & LAND INC.

FIGURE 17
COPPER AND ZINC LOADING – SEGMENT B
LOW FLOW

Date: SEPT 1993

Project: 232

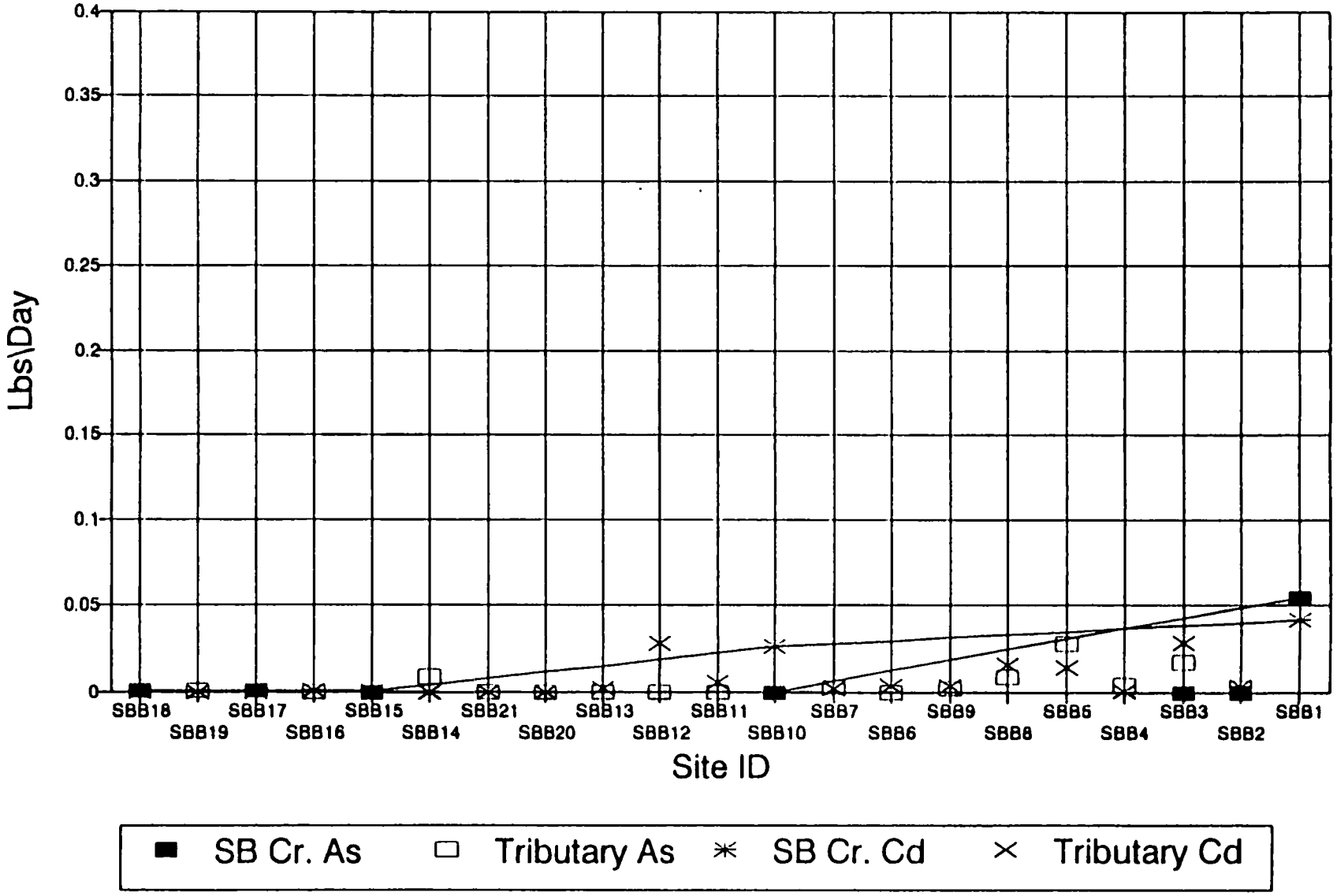


WATER WASTE & LAND INC.

FIGURE 18
COPPER AND ZINC LOADING - SEGMENT A
LOW FLOW

Date: SEPT 1993

Project: 232

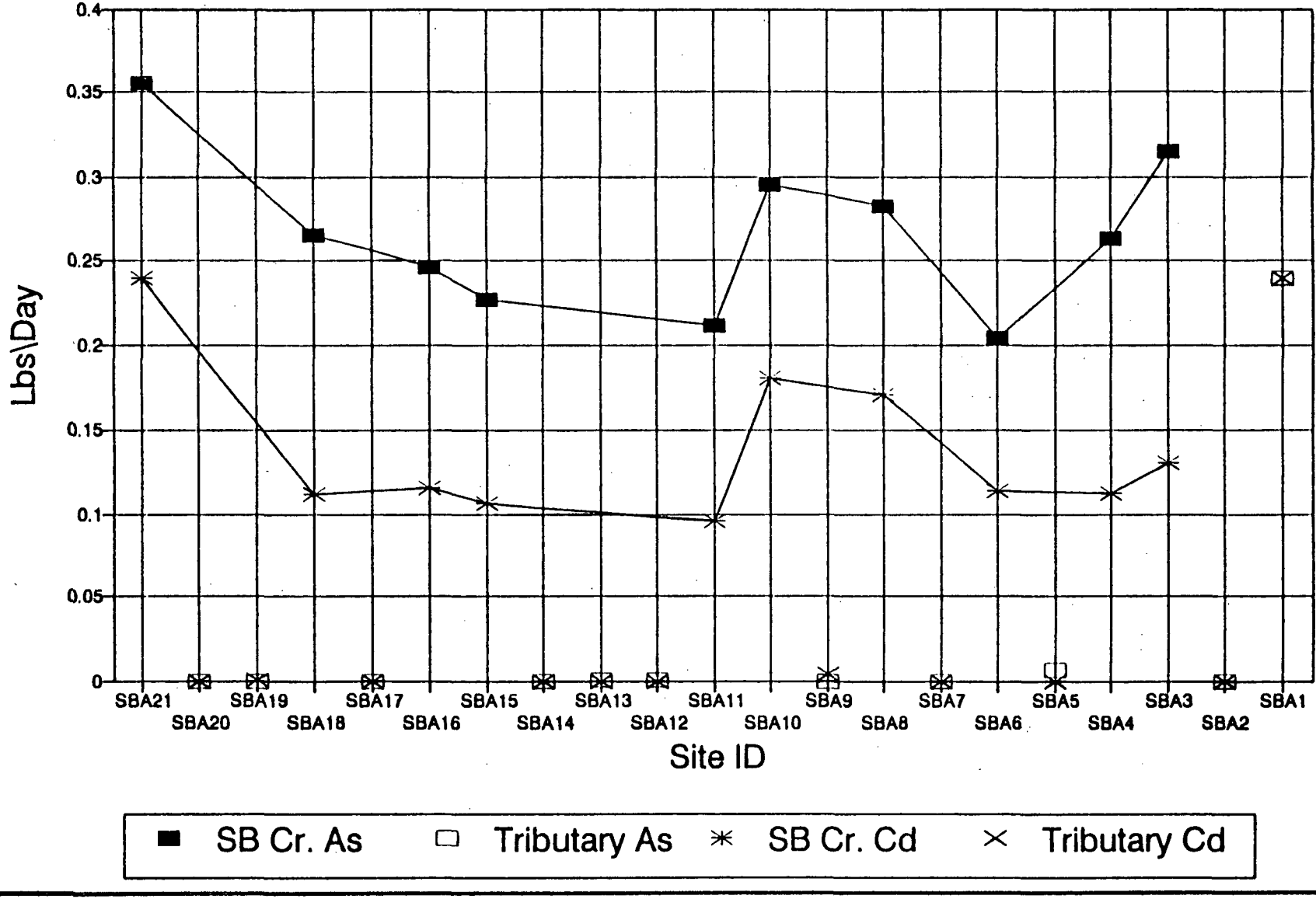


WATER WASTE & LAND INC.

FIGURE 19
ARSENIC AND CADMIUM - SEGMENT B
HIGH FLOW

Date: SEPT 1993

Project: 232



WATER WASTE & LAND INC.

FIGURE 20
ARSENIC AND CADMIUM – SEGMENT A
HIGH FLOW

Date: SEPT 1993

Project: 232

6.0 RESULTS AND CONCLUSIONS

Flows, metal concentrations, and metal loading characteristics resulting from the high-flow and low-flow events were discussed independently in Sections 3.0, 4.0 and 5.0. These results were considered in two major ways. First, the general overall changes in flows, concentrations and loadings observed in Segment A and B of the creek for each sampling event were considered. Second, changes in flows, concentrations and loadings within each reach of the creek defined by the individual sampling locations were examined to evaluate the effects of point and non-point sources.

A total of 44 and 35 locations were sampled during high-flow and low-flow events, respectively. When possible the same location was sampled during both sampling events. Many of the locations sampled in upper Strawberry Creek during the high-flow event were dry during the low-flow sampling event. A few new sampling locations were identified during the low-flow sampling event. The reduced flows and concentrations during the low-flow event resulted in reduced loadings as compared to the high-flow event. Aluminum, iron, copper and zinc loads in Strawberry Creek decreased by approximately a factor of 10 from the high-flow event to the low-flow event.

The highest concentrations of metals occurring in Strawberry Creek and its tributaries in decreasing order were aluminum, iron, copper, zinc, cadmium and arsenic. During the high-flow event, these metals were detected at most locations. During the low-flow event, zinc, cadmium and arsenic were below laboratory detection limits at most of the sample locations. Concentrations of mercury, selenium, silver, and lead were less than laboratory detection limits at all or most of the sampling locations during both the high-flow and low-flow sampling events.

Point sources of loading to Strawberry Creek were identified in Segments A and B. These sources consisted of seeps and tributaries. In general, the magnitude of loading contributed by the individual point sources was small in comparison to the loading contributed by non-point sources. Two reaches of Strawberry Creek accounted for the majority of non-point source loading. These reaches consist of the reach from below Pond D to below Pond E (SBB1 to SBA21) and the reach from below the Orifino mine to above Hoodo Gulch (SBA11 to SBA10). These loadings are believed to be associated with ground water contributions or with dissolution of metals as water contacts relic tailings or sediments.

During the high-flow sampling event, significant non-point sources of metal loadings were calculated in the reach below the CMP outlet to the sampling site below Pond E (SBB1 to SBA21). Relatively large increases in aluminum, copper, iron, arsenic, manganese and zinc loads were observed in this reach. The largest increase in dissolved and total recoverable iron loads, and total recoverable arsenic and copper loads were identified in this reach during the high-flow sampling event. Similar increases in non-point source loads were identified during the low-flow sampling event in the same reach from Pond D to below Pond E (SBB5 to SBA21). The source of the non-point loading within this reach is believed to result from the dissolution of metals as water contacts relic tailings that are present within this reach. The concentrations of sediments sampled from the stream bed are consistent with the identified increase in non-point source loading. The highest sediment concentrations of arsenic and iron in Strawberry Creek occurred at SBA21.

A significant gain in non-point source loading was also observed in lower Strawberry Creek in the reach downstream of the Orifino mine to upstream of Hoodo Gulch (SBA11 to SBA10) during both the high-flow and low-flow events. Loads for most metals typically reached maximum values in the creek at SBA10. The largest non-point source gains in sulfate, potassium, sodium, and magnesium loading, and dissolved and total recoverable loads of cadmium and manganese were observed

uring the peak-flow sampling event. Significant non-point source cium, potassium, sodium, and magnesium loading, and dissolved le loadings of iron, aluminum, copper and zinc loadings were reach during the low-flow sampling event. The increase in loadings crease in flow identified within this reach. Given the increase in flow oads for the major ions, the source of the loading within this reach rom ground water inflow. The non-point source load increase may lic tailings which are present in the reach. The higher iron sediment sample at SBA10 is consistent with the load increase.

the creek other than the above two reaches, metal concentrations r Strawberry Creek typically decreased in a downstream direction. ends in concentrations and loadings are believed to result from a ground water recharge and a decrease in concentrations due to itation.

Appendix B

Loading Evaluation Data

Appendix A

Surface Water Quality Data

m Mining Corporation
ns = mg/l, Temp. = °C, E.C. = umhos/cm

E	FLOW (gpm)	FIELD E.C.	FIELD TEMP.	TIME	HARD-NESS	LAB PH	FIELD pH	IIDE	SULFATE
93	6649	200	6.7	08:00 A	73.9	7.22	7.45	4.5	53.8
93	684	768	12	01:15 P	326.4	3.82	3.88	10	380
93	419.7	770	13.6	02:00 P	327.7	3.76	3.83	0.5	380
93	1.8	209	9.8	02:15 P	92.5	7.04	7.00	0.5	33.3
93	2.7	428	13.2	02:45 P	178.2	7.3	7.07	0.5	88.5
93	12.2	549	10.7	03:15 P	273.1	1.76	7.40	3.5	153
93	402	863	14.0	03:30 P	328.1	3.17	3.43	11	442
93	402	882	12.9	04:00 P	347.1	3.41	3.61	13	481
93	118.8	159	10.9	04:30 P	64.9	7.03	7.74	10	40
93	232.8	1286	12.6	05:00 P	475.3	3.18	3.21	9.5	656
93	14.12	385	10.6	05:30 P	156.2	7.13	7.06	54	16.7
93	6218	134	7.9	09:00 A	50.5	7.4	8.14	4	40
93	10	537	6.5	06:00 P	278.2	6.04	5.68	220	80.8
93	171	1354	12.3	06:15 P	489.7	3.01	3.28	11.5	703
93	NA	NA	NA	06:30 P	-10	7.2	NA	1	-10
93	171	1354	12.3	06:15 P	509.7	3.06	3.28	11.5	734
93	NA	2259	14.2	07:45 P	1036.2	3.14	3.19	43	1393
93	NA	2079	15.3	08:00 P	810.6	3.06	3.08	17.5	1446
93	905	515	6.7	09:15 A	210.1	4.78	4.97	5.5	236
93	781	509	7.6	10:00 A	211.5	4.68	5.35	5	241
93	274.4	155	7.7	10:30 A	73.4	7.73	6.49	-0.5	11.1
93	500	684	9.1	10:45 A	310.9	4.05	4.36	2.5	346
93	1	491	7	11:30 A	234.5	7.05	6.92	1.5	181
93	619	762	10.2	12:15 P	316.7	3.82	3.95	9	351
93	21.8	662	12.1	12:30 P	323.8	4.75	5.09	3	351
93	182.6	1023	9.0	07:50 A	439	3.87	4.03	7	538
93	96.9	680	10.6	12:55 P	327	6.4	6.12	2.5	324
93	20	525	14.8	01:45 P	365	6.31	5.99	3	382
93	71.5	1007	11.7	02:10 P	448	6.36	5.62	3.5	465
93	22.3	573	8	02:30 P	267	6.26	5.73	1.5	253
93	18.8	58	6 8	02:55 P	18.5	6.38	5.86	-0.5	18.2
93	26.4	317	13.8	03:20 P	121	6.78	6.48	0.5	100
93	6.7	1636	16.6	05:00 P	1054	6.8	7.12	12	941
93	14.03	95	14.1	05:30 P	35.4	7.09	7.34	-0.5	22.7
93	11	55	8.6	06:20 P	18.1	6.84	6.36	-0.5	-10
93	1.02	281	13	07:00 P	115	7.37	7.1	1.5	56.2
93	14.17	972	9.6	08:45 A	435	4.12	4.27	5.5	529
93	12	55	7.6	08:00 P	18.6	6.92	6.64	1	-10
3	9.94	66	7	08:20 P	22.8	7.11	6.99	-0.5	-10
3	NA	NA	NA	08:40 P	-3.3	7.03	NA	-0.5	-10
3	118.8	979	10	09:15 A	429	4.23	4.23	7.5	529
3	1.5	2493	8.5	09:50 A	734	2.8	2.68	12.5	1529
3	45	1500	11.6	10:20 A	733	3.55	3.45	9.5	906
3	27.4	869	13.9	10:45 A	395	5.24	5.46	3.5	438
3	10.4	1487	9.2	11:15 A	411	2.96	2.82	4	618
3	31	1614	10.8	11:45 A	891	4	4.12	10.5	938
3	31	1614	10.8	11:50 A	915	4.04	4.12	10.5	938
3	6.06	1856	10.7	12:30 P	1136	4.3	4.38	14	1206

Gilt Edge Mine, Brohm Mining Corporation
UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	ALUMINUM DISS.	ALUMINUM TOTAL	ARSENIC DISS.	ARSENIC TOTAL	CADMIUM DISS.	CADMIUM TOTAL
SBA1	05/18/93	0.284	1.26	-0.001	0.003	0.003	0.003
SBA10	05/18/93	13	16.1	0.003	0.036	0.016	0.022
SBA11	05/18/93	15.7	15.8	0.01	0.042	0.017	0.019
SBA12	05/18/93	-0.05	-0.05	0.002	0.002	-0.001	-0.001
SBA13	05/18/93	-0.05	0.381	-0.001	0.002	-0.001	-0.001
SBA14	05/18/93	0.061	0.116	-0.001	-0.001	-0.001	-0.001
SBA15	05/18/93	16	18.1	0.003	0.047	0.02	0.022
SBA16	05/18/93	18.3	18.3	0.012	0.051	0.018	0.024
SBA17	05/18/93	0.175	0.393	-0.001	-0.001	-0.001	-0.001
SBA18	05/18/93	26.1	28.2	0.06	0.095	0.036	0.04
SBA19	05/18/93	-0.05	0.191	-0.001	-0.001	-0.001	0.003
SBA2	05/18/93	0.524	1.02	-0.001	-0.001	-0.001	-0.001
SBA20	05/18/93	0.127	0.228	-0.001	-0.001	-0.001	-0.001
SBA21	05/18/93	28.1	28.8	0.074	0.173	0.03	0.038
SBA21B	05/18/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001
SBA21D	05/18/93	27.1	28.4	0.046	0.135	0.026	0.034
SBA22	05/18/93	24.8	30.4	0.073	0.079	0.271	3.14
SBA23	05/18/93	69.8	71.8	0.175	0.2	0.172	0.172
SBA3	05/18/93	1.14	6.26	0.001	0.029	0.01	0.012
SBA4	05/18/93	1.56	6.31	-0.001	0.028	0.011	0.012
SBA5	05/18/93	0.189	0.331	-0.001	0.002	-0.001	-0.001
SBA6	05/18/93	8.56	9.7	0.009	0.034	0.017	0.019
SBA7	05/18/93	-0.05	0.435	-0.001	-0.001	-0.001	-0.001
SBA8	05/18/93	10.5	10.8	0.002	0.038	0.023	0.023
SBA9	05/18/93	2.11	2.41	-0.001	-0.001	0.015	0.015
SBB1	05/18/93	7.63	7.97	0.02	0.025	0.018	0.019
SBB10	05/18/93	0.232	1.29	-0.001	-0.001	0.015	0.022
SBB11	05/18/93	0.362	1.3	-0.001	-0.001	0.022	0.024
SBB12	05/18/93	-0.05	1.54	-0.001	-0.001	0.031	0.032
SBB13	05/18/93	0.32	0.775	-0.001	-0.001	0.005	0.006
SBB14	05/18/93	1.23	1.3	0.002	0.039	-0.001	-0.001
SBB15	05/18/93	0.069	1.7	-0.001	-0.001	0.001	0.002
SBB16	05/18/93	0.353	1.65	-0.001	-0.001	0.006	0.007
SBB17	05/18/93	1.08	2.15	-0.001	0.003	-0.001	-0.001
SBB18	05/18/93	1.25	1.86	0.003	0.004	-0.001	-0.001
SBB19	05/18/93	0.256	0.514	-0.001	0.001	-0.001	-0.001
SBB2	05/18/93	5.89	6.25	0.012	0.014	0.016	0.018
SBB20	05/18/93	0.207	0.221	-0.001	-0.001	-0.001	-0.001
SBB21	05/18/93	0.431	0.532	-0.001	-0.001	-0.001	-0.001
SBB21B	05/18/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001
SBB3	05/18/93	4.66	5.91	0.011	0.012	0.019	0.02
SBB4	05/18/93	83.8	84.9	0.173	0.214	0.035	0.037
SBB5	05/18/93	15.1	17.3	0.042	0.051	0.023	0.026
SBB6	05/18/93	0.113	0.156	-0.001	-0.001	0.011	0.011
SBB7	05/18/93	7.69	7.86	0.014	0.02	0.015	0.015
SBB8	05/18/93	12	13.1	0.02	0.023	0.035	0.041
SBB8D	05/18/93	11.5	13.2	0.021	0.023	0.031	0.034
SBB9	05/18/93	8.68	9.14	0.017	0.021	0.046	0.05

Gilt Edge Mine, Brohm Mining Corporation

UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	CALCIUM DISS.	COPPER DISS.	COPPER TOTAL	IRON DISS.	IRON TOTAL	LEAD DISS.	LEAD TOTAL
SBA1	05/18/93	18.4	0.043	0.175	0.175	1.46	-0.001	-0.001
SBA10	05/18/93	95.1	2.62	2.66	1.73	13.4	-0.001	0.005
SBA11	05/18/93	14.8	2.61	2.82	2.1	15	-0.001	0.002
SBA12	05/18/93	25.8	0.002	0.002	-0.05	-0.05	-0.001	0.002
SBA13	05/18/93	51.1	-0.001	-0.001	-0.05	-0.05	-0.001	-0.001
SBA14	05/18/93	83	-0.001	-0.001	0.546	0.554	-0.001	0.002
SBA15	05/18/93	92	3.11	3.13	2.98	18	-0.001	0.004
SBA16	05/18/93	97.1	3.39	3.56	4.62	21.6	-0.001	0.002
SBA17	05/18/93	20.6	-0.001	0.002	0.067	0.146	-0.001	-0.001
SBA18	05/18/93	130	5.52	5.79	21.9	45	-0.001	0.003
SBA19	05/18/93	49.6	0.001	0.011	-0.05	0.112	-0.001	0.007
SBA2	05/18/93	12.3	-0.001	-0.001	0.28	0.685	-0.001	0.001
SBA20	05/18/93	71.6	0.002	0.003	-0.05	0.116	-0.001	0.001
SBA21	05/18/93	143	5.74	5.89	32.2	47.3	-0.001	0.003
SBA21B	05/18/93	-0.5	0.001	0.001	-0.05	-0.05	-0.001	0.001
SBA21D	05/18/93	139	5.61	6.1	29.6	51.2	0.001	0.004
SBA22	05/18/93	333	34.4	41.4	49.3	54.8	0.159	0.18
SBA23	05/18/93	195	51.2	51.4	78.6	81	0.035	0.036
SBA3	05/18/93	58.4	1.27	1.4	0.138	6.15	-0.001	0.002
SBA4	05/18/93	58.8	1.34	1.49	0.159	6.61	-0.001	0.002
SBA5	05/18/93	21.5	-0.001	-0.001	0.083	0.209	-0.001	-0.001
SBA6	05/18/93	90.2	2.11	2.25	0.298	10.5	-0.001	0.005
SBA7	05/18/93	69	-0.001	-0.001	0.117	1.69	-0.001	-0.001
SBA8	05/18/93	89.9	2.52	2.53	0.987	5.38	-0.001	0.004
SBA9	05/18/93	86.3	0.178	0.181	0.097	0.1	-0.001	-0.001
SBB1	05/18/93	115	0.44	0.441	0.941	3.66	0.002	0.003
SBB10	05/18/93	93.5	0.05	0.067	-0.05	0.395	-0.001	-0.001
SBB11	05/18/93	97.8	0.05	0.059	-0.05	0.079	-0.001	-0.001
SBB12	05/18/93	121	0.066	0.067	-0.05	-0.05	0.001	0.002
SBB13	05/18/93	76.2	0.002	0.003	-0.05	0.122	-0.001	0.002
SBB14	05/18/93	4.24	-0.001	0.002	0.442	0.678	-0.001	0.002
SBB15	05/18/93	33.3	0.004	0.007	0.126	0.384	-0.001	0.002
SBB16	05/18/93	303	0.011	0.018	-0.05	0.332	-0.001	-0.001
SBB17	05/18/93	9.49	0.002	0.003	0.362	0.608	-0.001	0.002
SBB18	05/18/93	4.34	0.001	0.002	0.376	0.491	-0.001	-0.001
SBB19	05/18/93	32	-0.001	0.002	0.201	0.847	0.001	0.001
SBB2	05/18/93	114	0.292	0.306	0.417	2.25	0.002	0.004
SBB20	05/18/93	4.81	-0.001	-0.001	0.143	0.145	-0.001	-0.001
SBB21	05/18/93	5.95	-0.001	-0.001	0.125	0.145	-0.001	0.001
SBB21B	05/18/93	-0.5	-0.001	0.005	-0.05	-0.05	-0.001	-0.001
SBB3	05/18/93	112	0.246	0.317	0.73	2.19	-0.001	0.002
SBB4	05/18/93	195	5.18	5.55	56.4	59.9	-0.001	-0.001
SBB5	05/18/93	194	0.771	0.814	1.47	2.99	0.005	0.005
SBB6	05/18/93	105	0.018	0.021	-0.05	-0.05	-0.001	-0.001
SBB7	05/18/93	107	0.263	0.277	14.7	14.9	-0.001	-0.001
SBB8	05/18/93	240	0.722	0.933	0.933	1.04	0.002	0.003
SBB8D	05/18/93	245	0.678	0.692	0.842	1.3	0.001	0.001
SBB9	05/18/93	310	1.06	1.06	0.108	2.42	-0.001	0.012

Gilt Edge Mine, Brohm Mining Corporation
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LOCATION	DATE	MAGNESI DISS.	MANGANESE DISS.	MANGANESE TOTAL	MERCURY DISS.	MERCURY TOTAL	POTASSIU DISS.
SBA1	05/18/93	6.78	0.174	0.189	-0.0002	-0.0002	1.41
SBA10	05/18/93	21.6	2.99	3.09	-0.0002	-0.0002	2.37
SBA11	05/18/93	22.1	3.12	3.23	-0.0002	-0.0002	2.27
SBA12	05/18/93	6.81	-0.05	-0.05	-0.0002	-0.0002	1.39
SBA13	05/18/93	12.3	-0.05	-0.05	-0.0002	-0.0002	2.37
SBA14	05/18/93	16	0.486	0.516	-0.0002	-0.0002	4.6
SBA15	05/18/93	23.9	3.43	3.63	-0.0002	-0.0002	2.1
SBA16	05/18/93	25.4	3.61	3.71	-0.0002	-0.0002	2.02
SBA17	05/18/93	3.26	-0.05	-0.05	-0.0002	-0.0002	0.55
SBA18	05/18/93	36.6	5.48	5.96	-0.0002	-0.0002	2.74
SBA19	05/18/93	7.85	-0.05	-0.05	-0.0002	-0.0002	1.44
SBA2	05/18/93	4.81	-0.05	-0.05	-0.0002	-0.0002	1.39
SBA20	05/18/93	12	0.096	0.107	-0.0002	-0.0002	1.69
SBA21	05/18/93	51.1	5.77	6.06	-0.0002	-0.0002	3.03
SBA21B	05/18/93	-0.5	-0.05	-0.05	-0.0002	-0.0002	-0.5
SBA21D	05/18/93	39.5	5.73	6.19	-0.0002	-0.0002	2.97
SBA22	05/18/93	19.7	6.82	7.53	-0.0002	-0.0002	11.9
SBA23	05/18/93	39.6	2.66	2.66	-0.0002	-0.0002	10.7
SBA3	05/18/93	15.6	1.8	1.89	-0.0002	-0.0002	1.99
SBA4	05/18/93	15.7	1.86	1.89	-0.0002	-0.0002	1.88
SBA5	05/18/93	4.78	-0.05	-0.05	-0.0002	-0.0002	1.19
SBA6	05/18/93	20.8	2.62	2.82	-0.0002	-0.0002	2.32
SBA7	05/18/93	15.1	0.359	0.384	-0.0002	-0.0002	2.71
SBA8	05/18/93	22.4	3.01	3.04	-0.0002	-0.0002	2.37
SBA9	05/18/93	26.3	2.34	2.46	-0.0002	-0.0002	4.24
SBB1	05/18/93	37	3.8	3.9	-0.0002	-0.0002	3.01
SBB10	05/18/93	22.7	1.12	1.19	-0.0002	-0.0002	2.63
SBB11	05/18/93	29.3	2.16	2.29	-0.0002	-0.0002	3.08
SBB12	05/18/93	35.4	1.02	1.08	-0.0002	-0.0002	3.56
SBB13	05/18/93	18.6	1.45	1.49	-0.0002	-0.0002	2.07
SBB14	05/18/93	1.92	-0.05	-0.05	-0.0002	-0.0002	0.86
SBB15	05/18/93	9.27	0.526	0.557	-0.0002	-0.0002	1.6
SBB16	05/18/93	72.3	0.28	0.329	-0.0002	-0.0002	3.29
SBB17	05/18/93	2.85	-0.05	0.061	-0.0002	-0.0002	0.94
SBB18	05/18/93	1.76	-0.05	-0.05	-0.0002	-0.0002	-0.5
SBB19	05/18/93	8.52	1.89	2.01	-0.0002	-0.0002	3.87
SBB2	05/18/93	36.5	3.67	3.67	-0.0002	-0.0002	3.11
SBB20	05/18/93	1.57	-0.05	-0.05	-0.0002	-0.0002	-0.5
SBB21	05/18/93	1.93	-0.05	-0.05	-0.0002	-0.0002	-0.5
SBB21B	05/18/93	-0.5	-0.05	-0.05	-0.0002	-0.0002	-0.5
SBB3	05/18/93	36.3	2.95	3.66	-0.0002	-0.0002	2.995
SBB4	05/18/93	60.7	14.1	15.1	-0.0002	-0.0002	0.75
SBB5	05/18/93	60.3	9.96	10.4	-0.0002	-0.0002	3.69
SBB6	05/18/93	32.3	0.511	0.534	-0.0002	-0.0002	3.51
SBB7	05/18/93	34.9	1.65	1.74	-0.0002	-0.0002	1.75
SBB8	05/18/93	70.8	11	11.1	-0.0002	-0.0002	4.43
SBB8D	05/18/93	73.6	9.5	10.4	-0.0002	-0.0002	4.07
SBB9	05/18/93	87.8	14.4	14.4	-0.0002	-0.0002	5.2

Gilt Edge Mine, Brohm Mining Corporation
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LOCATION	DATE	SELENIUM DISS.	SELENIUM TOTAL	SILVER DISS.	SILVER TOTAL	SODIUM DISS.	ZINC DISS.	ZINC TOTAL
SBA1	05/18/93	-0.005	-0.005	-0.001	-0.001	3.65	0.065	0.104
SBA10	05/18/93	-0.005	-0.005	-0.001	-0.001	6.16	0.798	0.824
SBA11	05/18/93	-0.005	-0.005	-0.001	0.001	6.26	0.821	0.899
SBA12	05/18/93	-0.005	-0.005	-0.001	-0.001	2.71	-0.05	0.705
SBA13	05/18/93	-0.005	-0.005	-0.001	-0.001	4.3	-0.05	0.065
SBA14	05/18/93	-0.005	-0.005	-0.001	-0.001	8.3	0.315	0.556
SBA15	05/18/93	-0.005	-0.005	-0.001	-0.001	6.37	0.916	1.24
SBA16	05/18/93	-0.005	-0.005	-0.001	-0.001	6.44	0.975	1.99
SBA17	05/18/93	-0.005	-0.005	-0.001	0.002	2.98	-0.05	0.063
SBA18	05/18/93	-0.005	-0.005	0.001	0.001	8.22	1.54	1.65
SBA19	05/18/93	-0.005	-0.005	-0.001	0.005	3.91	0.062	1.29
SBA2	05/18/93	-0.005	-0.005	-0.001	-0.001	3.67	-0.05	0.138
SBA20	05/18/93	-0.005	-0.005	-0.001	-0.001	6.07	0.121	0.516
SBA21	05/18/93	-0.005	-0.005	-0.001	0.001	8.51	1.5	1.73
SBA21B	05/18/93	-0.005	-0.005	-0.001	-0.001	2.5	0.052	0.34
SBA21D	05/18/93	-0.005	-0.005	-0.001	0.007	8.53	1.5	2.66
SBA22	05/18/93	-0.005	-0.005	0.002	0.002	28.2	4.01	5.5
SBA23	05/18/93	-0.005	-0.005	0.001	0.002	21.4	1.55	1.68
SBA3	05/18/93	-0.005	-0.005	-0.001	-0.001	4.87	0.504	0.534
SBA4	05/18/93	-0.005	-0.005	-0.001	-0.001	4.9	0.507	0.519
SBA5	05/18/93	-0.005	-0.005	-0.001	-0.001	2.62	-0.05	-0.05
SBA6	05/18/93	-0.005	-0.005	-0.001	-0.001	5.86	0.715	3.14
SBA7	05/18/93	-0.005	-0.005	-0.001	0.001	3.97	0.06	0.08
SBA8	05/18/93	-0.005	-0.005	-0.001	0.001	6.42	0.816	0.817
SBA9	05/18/93	-0.005	-0.005	-0.001	-0.001	7.47	0.564	0.725
SBB1	05/18/93	-0.005	-0.005	-0.001	-0.001	6.6	0.987	1.29
SBB10	05/18/93	-0.005	-0.005	-0.001	-0.001	5.57	0.811	0.882
SBB11	05/18/93	-0.005	-0.005	-0.001	-0.001	6.23	0.745	0.745
SBB12	05/18/93	-0.005	-0.005	-0.001	0.001	6.84	0.807	0.889
SBB13	05/18/93	-0.005	-0.005	-0.001	-0.001	5.19	0.252	0.252
SBB14	05/18/93	-0.005	-0.005	-0.001	0.001	21.5	-0.05	0.07
SBB15	05/18/93	-0.005	-0.005	-0.001	-0.001	3.97	0.051	0.097
SBB16	05/18/93	-0.005	-0.005	-0.001	-0.001	13.9	0.055	0.378
SBB17	05/18/93	-0.005	-0.005	-0.001	-0.001	2.5	-0.05	0.052
SBB18	05/18/93	-0.005	-0.005	-0.001	-0.001	2.22	-0.05	0.07
SBB19	05/18/93	-0.005	-0.005	-0.001	-0.001	3.62	-0.05	0.103
SBB2	05/18/93	-0.005	-0.005	-0.001	-0.001	6.38	0.957	1.11
SBB20	05/18/93	-0.005	-0.005	-0.001	-0.001	1.77	-0.05	-0.05
SBB21	05/18/93	-0.005	-0.005	-0.001	-0.001	2.19	0.05	0.112
SBB21B	05/18/93	-0.005	-0.005	-0.001	-0.001	2.3	-0.05	0.095
SBB3	05/18/93	-0.005	-0.005	-0.001	-0.001	6.37	0.957	1.56
SBB4	05/18/93	-0.005	-0.005	0.001	0.001	10.9	4.91	6.08
SBB5	05/18/93	-0.005	-0.005	0.001	0.001	7.47	0.58	0.661
SBB6	05/18/93	-0.005	-0.005	-0.001	-0.001	6.51	0.629	0.763
SBB7	05/18/93	-0.005	-0.005	-0.001	-0.001	6.36	0.761	0.781
SBB8	05/18/93	-0.005	-0.005	-0.001	0.001	7.58	1.31	1.47
SBB8D	05/18/93	-0.005	-0.005	-0.001	-0.001	7.63	1.11	1.67
SBB9	05/18/93	-0.005	-0.005	-0.001	-0.001	8.19	1.91	2.04

Surface Water Quality Data - Low-Flow Sampling
Gilt Edge Mine, Brohm Mining Corporation
UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	TIME	FLOW GPM	FIELD CONDUCTIVITY	FIELD TEMP.	FIELD pH	HARDNES	LAB pH
S8B22B	08/24/93	1830	0	NA	NA	NA	-0.5	7.1
S8B16A	08/24/93	1645	0.24	1707	26	6.97	919	6.79
S8B15A	08/24/93	1630	0	666	28.5	7.01	285	7.01
S8B12A	08/24/93	1530	2.3	1316	12	5.55	683	6.01
S8B11	08/24/93	1515	0	991	23.1	5.6	455	6.2
S8B10A	08/24/93	1430	4.1	845	13.5	5.03	380	5.4
S8B10AD	08/24/93	1430	4.1	845	13.5	5.03	375	5.39
S8B9B	08/24/93	1400	1.2	957	15.3	4.27	441	4.48
S8B9A	08/24/93	1345	1.7	1487	11.7	3.97	816	4.28
S8B9	08/24/93	1315	4.6	1287	17.3	4.11	578	4.32
S8B10B	08/24/93	1215	15.6	1058	19.6	4.52	468	4.5
S8B8	08/24/93	1145	15.2	1134	19.4	3.85	477	3.96
S8B5	08/24/93	1100	22.3	1346	18	3.33	499	3.42
S8B4A	08/24/93	1015	1.1	2862	10.1	2.84	977	2.94
S8B1	08/24/93	945	28	1450	13.5	3.3	522	3.2
S8A21A	08/24/93	845	29	1544	10.9	3.29	506	3.27
S8A22	08/24/93	1800	0	2872	25.2	2.94	905	3.05
S8A23	08/24/93	1745	0	3100	21.5	2.72	769	2.77
S8A18	08/24/93	1730	15.4	2028	20.6	2.77	540	2.93
S8A17	08/24/93	1715	15.4	262	14.5	6.46	111	7.82
S8A16	08/24/93	1655	27.4	1105	17.4	3.27	332	3.34
S8A15	08/24/93	1645	32.1	944	19.7	3.65	311	3.65
S8A14	08/24/93	1630	8	541	13.3	6.77	269	7.48
S8A13	08/24/93	1600	0.1	511	13	6.74	238	7.37
S8A12	08/24/93	1530	>0.1	401	13.8	6.34	163	7.04
S8A11	08/24/93	1500	42.8	766	18.9	4.68	290	4.22
S8A9	08/24/93	1400	3.1	939	19	5.6	427	6.08
S8A10	08/24/93	1345	79.8	786	14.4	4.59	342	4.21
S8A8	08/24/93	1330	83.8	798	13.8	4.6	299	4.17
S8A7	08/24/93	1300	0.5	514	1	6.27	228	7.15
S8A6	08/24/93	1200	68.6	746	15.7	4.72	290	4.39
S8A5	08/24/93	1145	41	279	12.1	7.79	121	8.12
S8A4	08/24/93	1115	179.6	525	13.4	6.76	227	6.82
S8A3D	08/24/93	1015	206.9	528	11.5	7.76	225	7.28
S8A3	08/24/93	1015	206.9	528	11.5	7.76	226	7.39
S8A2	08/24/93	950	849	245	12.8	7.98	103	8.07
S8A1	08/24/93	845	1052	307	8.3	7.84	128	7.62
S8A21	08/24/93	815	22.16	1873	10.5	3.02	543	3.02
S8A18B	08/24/93		0	NA	NA	NA	-5	7.28

Gilt Edge Mine, Brohm Mining Corporation
UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	SOLIDS DISSOLVE	SOLIDS SUSPEND	CARBONATE BICARBONATE		CHLORIDE	SULFATE
SBB22B	08/24/93	34	-10	17.1	0	9.5	-10
SBB16A	08/24/93	865	34	22	0	15	944
SBB15A	08/24/93	318	29	100	0	3	242
SBB12A	08/24/93	631	51	39	0	10	600
SBB11	08/24/93	488	-10	19.5	0	9.5	450
SBB10A	08/24/93	420	-10	-10	0	9	383
SBB10AD	08/24/93	419	-10	-10	0	9	383
SBB9B	08/24/93	497	16	0	0	10	193
SBB9A	08/24/93	743	18	0	0	12	778
SBB9	08/24/93	621	-10	0	0	10.5	625
SBB10B	08/24/93	517	-10	-10	0	10.5	500
SBB8	08/24/93	557	-10	0	0	10	538
SBB5	08/24/93	647	-10	0	0	9.5	656
SBB4A	08/24/93	1420	23	0	0	7.5	2056
SBB1	08/24/93	728	-10	0	0	9	717
SBA21A	08/24/93	742	-10	0	0	9	793
SBA22	08/24/93	1440	20	0	0	46.5	1639
SBA23	08/24/93	1515	12	0	0	7	1917
SBA18	08/24/93	1025	19	0	0	12.5	1233
SBA17	08/24/93	132	13	146	0	5	12.5
SBA16	08/24/93	584	65	0	0	9.5	557
SBA15	08/24/93	497	36	0	0	8.5	461
SBA14	08/24/93	281	-10	178	0	1	143
SBA13	08/24/93	257	-10	183	0	0.5	117
SBA12	08/24/93	191	-10	137	0	0.5	88.5
SBA11	08/24/93	395	54	0	0	6.5	378
SBA9	08/24/93	495	-10	-10	0	5.5	494
SBA10	08/24/93	398	42	0	0	6.5	378
SBA8	08/24/93	402	31	0	0	6.5	378
SBA7	08/24/93	247	11	134	0	2.5	133
SBA6	08/24/93	387	26	0	0	5.5	361
SBA5	08/24/93	138	-10	161	0	-0.5	12.5
SBA4	08/24/93	261	39	51.2	0	3	200
SBA3D	08/24/93	258	31	48.8	0	3	200
SBA3	08/24/93	259	20	51.2	0	3	200
SBA2	08/24/93	123	-10	120	0	7	12.5
SBA1	08/24/93	153	-10	105	0	6	50
SBA21	08/24/93	899	-10	0	0	10.5	1100
SBA18B	08/24/93	34	-10	14.6	0	9	-10

Gilt Edge Mine, Brohm Mining Corporation
UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	ALUMINUM DISS.	ALUMINUM TOTAL	ARSENIC DISS.	ARSENIC TOTAL	CADMIUM DISS.	CADMIUM TOTAL	CALCIUM DISS.
SBB22B	08/24/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001	-0.5
SBB16A	08/24/93	0.08	1.25	-0.001	-0.001	0.01	0.01	257
SBB15A	08/24/93	-0.05	0.282	-0.001	0.002	-0.001	-0.001	78.6
SBB12A	08/24/93	0.076	1.38	-0.001	0.002	0.011	0.011	198
SBB11	08/24/93	0.232	0.37	-0.001	0.001	0.012	0.012	128
SBB10A	08/24/93	0.93	1.11	0.001	0.001	0.011	0.011	105
SBB10AD	08/24/93	1.24	1.24	-0.001	-0.001	0.01	0.011	103
SBB9B	08/24/93	4.45	4.76	0.005	0.007	0.026	0.028	118
SBB9A	08/24/93	5.67	5.72	0.007	0.009	0.05	0.05	227
SBB9	08/24/93	5.34	5.49	0.007	0.009	0.034	0.04	154
SBB10B	08/24/93	3.5	3.61	0.005	0.006	0.019	0.019	129
SBB8	08/24/93	6.32	6.55	0.008	0.011	0.018	0.019	129
SBB5	08/24/93	14.8	15.6	0.02	0.023	0.02	0.022	137
SBB4A	08/24/93	164	167	0.025	0.037	0.064	0.066	283
SBB1	08/24/93	21.6	22.2	0.023	0.023	0.019	0.024	143
SBA21A	08/24/93	24.5	24.8	0.014	0.016	0.025	0.032	134
SBA22	08/24/93	57	57	0.021	0.023	0.348	0.355	257
SBA23	08/24/93	89.8	96.7	0.045	0.049	0.286	0.293	214
SBA18	08/24/93	56.8	57.9	0.051	0.052	0.058	0.061	141
SBA17	08/24/93	-0.05	0.387	-0.001	-0.001	-0.001	-0.001	36.7
SBA16	08/24/93	27.2	29.1	0.032	0.04	0.025	0.028	89.5
SBA15	08/24/93	21.3	21.5	0.023	0.026	0.024	0.024	85.5
SBA14	08/24/93	-0.05	0.06	-0.001	0.001	-0.001	-0.001	84.2
SBA13	08/24/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001	69.8
SBA12	08/24/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001	45.4
SBA11	08/24/93	9.82	13	0.015	0.024	0.02	0.021	81.5
SBA9	08/24/93	1.14	1.74	-0.001	-0.001	0.021	0.022	112
SBA10	08/24/93	10.5	12.4	0.015	0.022	0.015	0.016	102
SBA8	08/24/93	10	11.9	0.015	0.021	-0.001	0.004	84
SBA7	08/24/93	-0.05	0.118	-0.001	-0.001	-0.001	0.001	67.9
SBA6	08/24/93	8.6	10.3	0.015	0.017	0.016	0.019	80.5
SBA5	08/24/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001	36.5
SBA4	08/24/93	0.186	5.61	-0.001	0.008	0.008	0.009	67.1
SBA3D	08/24/93	0.111	4.77	-0.001	0.009	0.004	0.005	66
SBA3	08/24/93	0.109	4.92	-0.001	0.011	0.004	0.005	66
SBA2	08/24/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001	27.2
SBA1	08/24/93	-0.05	0.784	-0.001	0.001	-0.001	-0.001	34.7
SBA21	08/24/93	34.5	41.9	0.075	0.203	0.025	0.043	142
SBA18B	08/24/93	-0.05	-0.05	-0.001	-0.001	-0.001	-0.001	-0.5

Gilt Edge Mine, Brohm Mining Corporation
UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	COPPER DISS.	COPPER TOTAL	IRON DISS.	IRON TOTAL	LEAD DISS.	LEAD TOTAL	MAGNESI DISS.
SBB22B	08/24/93	0.073	0.076	-0.05	-0.05	-0.001	-0.001	-0.5
SBB16A	08/24/93	0.023	0.032	-0.05	0.359	-0.001	-0.001	67.4
SBB15A	08/24/93	-0.001	0.004	0.063	1.2	-0.001	-0.001	21.6
SBB12A	08/24/93	0.003	0.015	-0.05	0.651	-0.001	0.002	45.7
SBB11	08/24/93	0.058	0.069	0.079	0.286	-0.001	-0.001	32.9
SBB10A	08/24/93	0.053	0.061	0.123	0.249	-0.001	0.001	28.6
SBB10AD	08/24/93	0.065	0.065	0.079	0.496	-0.001	0.004	28.7
SBB9B	08/24/93	0.673	0.72	0.27	0.705	-0.001	-0.001	35.6
SBB9A	08/24/93	1.06	1.06	0.241	0.263	-0.001	-0.001	60.5
SBB9	08/24/93	0.814	0.816	0.263	0.357	-0.001	-0.001	47
SBB10B	08/24/93	0.349	0.35	0.172	0.203	-0.001	-0.001	35.5
SBB8	08/24/93	0.417	0.424	0.341	0.467	-0.001	-0.001	37.6
SBB5	08/24/93	0.823	0.843	6.11	6.59	-0.001	-0.001	38
SBB4A	08/24/93	8.42	8.87	93.5	93.6	-0.001	-0.001	65.6
SBB1	08/24/93	1.3	1.38	10.4	10.4	-0.001	-0.001	40.1
SBA21A	08/24/93	2.25	2.26	12.7	12.8	-0.001	-0.001	41.7
SBA22	08/24/93	39.3	40.7	17.6	18.8	0.085	0.095	64
SBA23	08/24/93	69.5	75.7	91.5	94.6	0.003	0.004	57
SBA18	08/24/93	9.6	10.3	46.3	47.5	-0.001	-0.001	45.7
SBA17	08/24/93	-0.001	-0.001	-0.05	-0.05	-0.001	-0.001	4.79
SBA16	08/24/93	5.46	5.58	10.3	21.7	-0.001	-0.001	26.3
SBA15	08/24/93	4.16	4.26	1.49	10.3	-0.001	-0.001	23.7
SBA14	08/24/93	-0.001	-0.001	0.542	0.784	-0.001	-0.001	14.3
SBA13	08/24/93	0.002	0.002	-0.05	0.152	-0.001	-0.001	15.5
SBA12	08/24/93	0.004	0.006	-0.05	-0.05	-0.001	-0.001	12
SBA11	08/24/93	2.68	2.74	0.54	6.52	-0.001	-0.001	20.9
SBA9	08/24/93	0.125	0.133	0.1	0.163	-0.001	-0.001	35.7
SBA10	08/24/93	2.6	2.78	0.568	6.13	-0.001	-0.001	21.2
SBA8	08/24/93	2.49	2.52	0.613	5.51	-0.001	-0.001	21.7
SBA7	08/24/93	0.001	0.001	1.25	3.19	-0.001	-0.001	14.3
SBA6	08/24/93	2.1	2.25	0.07	3.66	-0.001	-0.001	21.5
SBA5	08/24/93	0.001	0.001	-0.05	0.147	-0.001	-0.001	7.17
SBA4	08/24/93	0.384	1.11	-0.05	1.8	-0.001	-0.001	14.5
SBA3D	08/24/93	0.051	0.98	-0.05	1.59	-0.001	-0.001	14.6
SBA3	08/24/93	0.05	0.99	-0.05	1.61	-0.001	-0.001	14.9
SBA2	08/24/93	-0.001	-0.001	-0.05	0.161	-0.001	-0.001	8.62
SBA1	08/24/93	0.023	0.154	-0.05	0.375	-0.001	-0.001	9.95
SBA21	08/24/93	5.66	6.66	36.8	38.7	-0.001	-0.001	45.7
SBA18B	08/24/93	0.07	0.082	-0.05	-0.05	-0.001	-0.001	-0.5

Gilt Edge Mine, Brohm Mining Corporation
UNITS: Concentrations = mg/l, Temp. = °C, E.C. = umhos/cm

LOCATION	DATE	SILVER DISS.	SILVER TOTAL	SODIUM DISS.	ZINC DISS.	ZINC TOTAL	LABNUMBER
SBB22B	08/24/93	-0.001	-0.001	11.7	-0.05	-0.05	19930901315
SBB16A	08/24/93	0.002	0.002	18.7	0.168	0.534	19930901314
SBB15A	08/24/93	-0.001	-0.001	6.62	-0.05	0.064	19930901313
SBB12A	08/24/93	0.001	0.001	9.94	0.526	0.535	19930901312
SBB11	08/24/93	-0.001	-0.001	8.2	0.432	0.446	19930901311
SBB10A	08/24/93	-0.001	-0.001	8.15	0.368	0.413	19930901308
SBB10AD	08/24/93	-0.001	-0.001	8.12	0.352	0.705	19930901309
SBB9B	08/24/93	-0.001	-0.001	8.22	0.621	0.752	19930901307
SBB9A	08/24/93	-0.001	-0.001	8.67	0.998	1.02	19930901306
SBB9	08/24/93	-0.001	-0.001	8.39	0.767	0.811	19930901305
SBB10B	08/24/93	-0.001	-0.001	8.21	0.509	0.511	19930901310
SBB8	08/24/93	-0.001	-0.001	8.25	0.61	0.639	19930901304
SBB5	08/24/93	0.001	0.001	8.5	1.02	1.13	19930901303
SBB4A	08/24/93	0.002	0.003	14.1	8.45	8.67	19930901302
SBB1	08/24/93	0.001	0.001	9.08	1.45	1.45	19930901301
SBA21A	08/24/93	-0.001	-0.001	9.29	1.7	1.86	19930830422
SBA22	08/24/93	-0.001	-0.001	112	4.49	4.6	19930830423
SBA23	08/24/93	-0.001	-0.001	24.5	2.84	2.99	19930830424
SBA18	08/24/93	-0.001	-0.001	11.7	2.6	2.64	19930830419
SBA17	08/24/93	-0.001	-0.001	3.57	-0.05	0.073	19930830418
SBA16	08/24/93	-0.001	-0.001	8	1.42	1.44	19930830417
SBA15	08/24/93	-0.001	-0.001	7.56	1.21	1.29	19930830416
SBA14	08/24/93	-0.001	-0.001	7.45	0.05	0.293	19930830415
SBA13	08/24/93	-0.001	-0.001	4.75	-0.05	0.094	19930830414
SBA12	08/24/93	-0.001	-0.001	3.83	0.058	0.064	19930830413
SBA11	08/24/93	-0.001	-0.001	7.03	0.773	0.802	19930830412
SBA9	08/24/93	-0.001	-0.001	8.95	0.688	0.701	19930830410
SBA10	08/24/93	-0.001	-0.001	7.15	0.783	0.808	19930830411
SBA8	08/24/93	-0.001	-0.001	7.13	0.766	0.84	19930830409
SBA7	08/24/93	-0.001	-0.001	3.74	-0.05	0.085	19930830408
SBA6	08/24/93	-0.001	-0.001	7.12	0.699	0.848	19930830407
SBA5	08/24/93	-0.001	-0.001	3.5	-0.05	-0.05	19930830406
SBA4	08/24/93	-0.001	-0.001	5.24	0.376	0.51	19930830405
SBA3D	08/24/93	-0.001	-0.001	5.33	0.197	0.49	19930830404
SBA3	08/24/93	-0.001	-0.001	5.31	0.211	0.435	19930830403
SBA2	08/24/93	-0.001	-0.001	4.12	-0.05	-0.05	19930830402
SBA1	08/24/93	-0.001	-0.001	4.4	-0.05	-0.05	19930830401
SBA21	08/24/93	-0.001	-0.001	10.6	1.88	2.18	19930830421
SBA18B	08/24/93	-0.001	-0.001	11.5	-0.05	0.05	19930830420

CADMIUM TOTAL	CALCIUM TOTAL	COPPER TOTAL	ION TOTAL	LEAD TOTAL	MAGNESIUM TOTAL	MANGANESE TOTAL	POTASSIUM TOTAL	SELENIUM TOTAL
0.023	54.1	0.35	1860	1.93	72.6	37.5	53.3	<.010
0.014	48.2	0.37	450	0.5	51.8	21.7	33.5	<.010
0.029	77.2	1.17	580	2.57	76.3	25.4	43.9	<.010
0.009	250	2.87	1580	0.98	81.6	29.7	36.9	<.010
0.018	49.9	1.33	620	0.62	77.5	23.4	42.6	<.010
0.042	207	3.69	1260	1.21	73.6	18	48.5	<.010
0.04	74.7	7	1220	4.04	77.4	19.4	47.8	<.010
0.019	99.7	1.89	1490	2.29	74.1	28.6	80.8	<.010
0.034	104	3.66	1540	4.87	85.4	21.5	86.8	<.010
0.025	40.4	2.14	770	2.38	51.2	11.1	33.5	<.005
0.028	1326	3.12	1130	3.82	42.6	7.53	46.4	<.010
0.039	42.1	6.13	1160	6.66	53.6	6.75	55.4	<.010
0.012	24.2	2.82	1330	1.69	55.8	6.67	84.2	<.010
0.005	9.8	2.44	1050	3.39	20.2	0.789	63.7	<.010
0.028	974	1.68	810	4.02	62.4	4.02	50.5	<.010
0.018	309	3.26	1320	8.77	54.2	2.82	61	<.010
0.01	14.7	2.77	1170	3.65	52.6	3.35	87.1	<.010
0.024	1364	16.6	1020	2.82	74.6	3.42	65.5	<.010
0.009	26.9	4.99	1080	2.94	134	2.94	76.4	<.010
0.001	4.52	1.86	710	3.17	24.7	0.564	59	<.010
0.092	10.3	8.8	550	2.26	31.2	120	36.3	<.010
0.009	6.02	2.78	630	2.41	35.1	2.19	36	<.010
0.021	20.2	8.11	1300	4.96	188	22.1	145	<.010
0.016	35.4	0.695	850	0.8	200	20.9	26.2	<.010
0.027	19	9.63	1160	2.86	208	26	21.1	<.010
0.025	20	6.96	860	1.95	144	26.8	95.3	<.010
0.019	38.7	1.45	1110	1.14	194	43.7	105	<.010
0.037	43.6	3.56	1000	4.09	116	31.8	70.4	<.010
0.081	91.6	5.92	1680	1.31	79.8	27.9	60.78	<.010
0.033	50	4.364	1800	6.02	117	24.3	92.7	<.010
0.034	222	5.46	2960	4.03	160	83.2	46.8	<.010
0.04	120	5.76	2600	3.25	115	36.5	83.7	<.010
0.034	81	3.6	2290	4.44	142	21.8	101	<.010
0.03	31.9	4.6	2130	8.91	59.4	28	80.1	<.010
0.023	30.3	2.89	1250	4.03	72.6	10.2	89.9	<.010
0.085	120	4.95	2230	13.1	105	75.8	101	<.010
0.017	44.2	3.43	1970	4.64	83.8	42.6	74.5	<.010
0.01	30.9	3.87	2490	3.56	2490	24.4	102	<.010
0.015	29.9	4.9	1970	4.99	209	14	101	<.010
0.014	22.5	4.04	2130	3.71	223	18.5	98.6	<.010
0.009	19	3.55	2550	3.84	74.8	7.33	103	<.010
0.006	17.2	4.04	3860	3.26	62.8	4.06	88.4	<.010
0.009	14.1	3.24	1950	3.23	44.4	4.78	77.7	<.010
0.019	168	1.41	750	2.06	60.1	39.2	55.4	<.010
0.009	13.5	3.44	1910	2.55	30.4	8.2	46.1	<.010
0.012	4150	11.3	1090	2.32	138	7.96	67.7	<.010
0.011	14.6	8.59	2350	4.23	331	8.2	191	<.010
0.012	16.2	9.17	2620	6.41	176	11.5	102	<.010
0.037	36.4	5.95	1140	5.34	198	88	103	<.010
0.011	9	5.74	1590	3.68	94.1	10.1	89.6	<.010
0.014	37.5	8.46	1910	7.59	146	29.2	94.3	<.010
0.018	76.1	0.782	500	0.7	100	23.1	68.7	<.010
0.035	21.7	36.2	1260	2.73	89.3	28.4	90.5	<.010
0.03	29	10.6	1205	0.562	<.50	11.4	83.4	<.010
0.018	48.9	1.16	1430	7.96	155	86.5	86	<.010
0.027	61.1	5.93	1400	1.93	174	47.3	129	<.010

Appendix B

Loading Evaluation Data

Loading Evaluation Data
NPS = Non-Point Source

Main Trib	Primar Trib	Second Trib	Third Trib	DATE	K (lbs\day)	Ag (lbs\day)	Na (lbs\day)	Zn (lbs\day) DISS.	Zn (lbs\day) TOTAL
SBA1				05/18/93	112.5	0.0	291.2	5.2	8.3
NPS					-12.8	0.0	-35.5	-0.3	-7.8
SBA3				05/18/93	21.6	0.0	52.9	5.5	5.8
SBA2				05/18/93	103.7	0.0	273.8	0.0	10.3
NPS					4.0	0.0	7.0	0.7	0.9
SBA4				05/18/93	17.6	0.0	45.9	4.8	4.9
NPS					-0.2	0.0	2.1	0.5	-14.0
	SBA5			05/18/93	3.9	0.0	8.6	0.0	0.0
SBA6				05/18/93	13.9	0.0	35.2	4.3	18.8
NPS					-3.7	-0.0	-12.6	-1.8	12.8
	SBA7			05/18/93	0.0	0.0	0.0	0.0	0.0
SBA8				05/18/93	17.6	0.0	47.7	6.1	6.1
NPS					-3.0	0.0	-4.8	-0.6	-0.9
	SBA9			05/18/93	1.1	0.0	2.0	0.1	0.2
SBA10				05/18/93	19.5	0.0	50.6	6.5	6.8
NPS					8.0	-0.0	19.0	2.4	2.2
SBA11				05/18/93	11.4	0.0	31.5	4.1	4.5
NPS					0.5	0.0	-0.6	-0.3	-1.6
	SBA12			05/18/93	0.0	0.0	0.1	0.0	0.0
	SBA13			05/18/93	0.1	0.0	0.1	0.0	0.0
	SBA14			05/18/93	0.7	0.0	1.2	0.0	0.1
SBA15				05/18/93	10.1	0.0	30.7	4.4	6.0
NPS					0	0	0	0	0
SBA16				05/18/93	9.7	0.0	31.1	4.7	9.6
NPS					1.3	-0.0	3.9	0.4	4.9
	SBA17			05/18/93	0.8	0.0	4.2	0.0	0.1
SBA18				05/18/93	7.7	0.0	23.0	4.3	4.6
NPS					1.0	-0.0	4.1	1.2	0.8
	SBA19			05/18/93	0.2	0.0	0.7	0.0	0.2
	SBA20			05/18/93	0.2	0.0	0.7	0.0	0.1
SBA21				05/18/93	6.2	0.0	17.5	3.1	3.5
NPS					-0.4	0.0	3.0	0.9	0.7
SBB1				05/18/93	6.6	0.0	14.5	2.2	2.8
NPS					1.5	-0.0	4.0	0.9	1.4
	NPS				1.8	0.0	4.3	0.6	0.4
SBB2				05/18/93	0.5	0.0	1.1	0.2	0.2
SBB3				05/18/93	4.3	0.0	9.1	1.4	2.2
	SBB4			05/18/93	0.0	0.0	0.2	0.1	0.1
	SBB5			05/18/93	2.0	0.0	4.0	0.3	0.4
	NPS				0.3	0.0	1.2	-0.2	-0.2
		SBB8		05/18/93	1.6	0.0	2.8	0.5	0.5
		NPS			-0.1	0.0	-0.7	0.0	0.1
		SBB9		05/18/93	0.4	0.0	0.6	0.1	0.1
		SBB6		05/18/93	1.2	0.0	2.1	0.2	0.3
		SBB7		05/18/93	0.2	0.0	0.8	0.1	0.1
SBB10				05/18/93	3.1	0.0	6.5	0.9	1.0
NPS					1.8	0.0	3.7	0.7	0.8
	SBB11			05/18/93	0.7	0.0	1.5	0.2	0.2
	NPS				-3.1	-0.0	-10.6	-0.6	-0.7
		SBB12		05/18/93	3.1	0.0	5.9	0.7	0.8
		SBB13		05/18/93	0.6	0.0	1.4	0.1	0.1
		NPS			0.6	0.0	0.9	0.1	0.1
			SBB20	05/18/93	0.0	0.0	0.3	0.0	0.0
			SBB21	05/18/93	0.0	0.0	0.3	0.0	0.0
		SBB14		05/18/93	0.2	0.0	4.9	0.0	0.0
SBB15				05/18/93	0.5	0.0	1.3	0.0	0.0
NPS					0.1	0.0	-0.3	0.0	-0.0
	SBB16			05/18/93	0.3	0.0	1.1	0.0	0.0
SBB17				05/18/93	0.2	0.0	0.4	0.0	0.0
NPS					0.1	0.0	0.1	0.0	-0.0
	SBB19			05/18/93	0.0	0.0	0.0	0.0	0.0
SBB18				05/18/93	0.0	0.0	0.3	0.0	0.0

Loading Evaluation Data
NPS = Non-Point Source

Main Trib	Primar Trib	Second Trib	Third Trib	DATE	Ca (lbs\day) DISS.	Cu (lbs\day) DISS.	Cu (lbs\day) TOTAL	Fe (lbs\day) DISS.	Fe (lbs\day) TOTAL
SBA1				05/18/93	1468.1	3.4	14.0	14.0	116.5
NPS					-83.9	-10.4	-1.2	-8.4	-1.4
SBA3				05/18/93	634.2	13.8	15.2	1.5	66.8
SBA2				05/18/93	917.8	0.0	0.0	20.9	51.1
NPS					83.2	1.2	1.2	0.0	4.8
SBA4				05/18/93	551.1	12.6	14.0	1.5	61.9
NPS					-60.9	-0.1	0.5	-0.6	-1.7
	SBA5			05/18/93	70.8	0.0	0.0	0.3	0.7
SBA6				05/18/93	541.2	12.7	13.5	1.8	63.0
NPS					-127.4	-6.1	-5.3	-5.5	23.0
	SBA7			05/18/93	0.8	0.0	0.0	0.0	0.0
SBA8				05/18/93	667.8	18.7	18.8	7.3	40.0
NPS					-135.4	-2.8	-3.1	-6.9	-70.1
	SBA9			05/18/93	22.6	0.0	0.0	0.0	0.0
SBA10				05/18/93	780.6	21.5	21.8	14.2	110.0
NPS					706.0	8.4	7.6	3.6	34.4
SBA11				05/18/93	74.5	13.1	14.2	10.6	75.5
NPS					-383.6	-1.9	-0.9	-3.9	-11.4
	SBA12			05/18/93	0.6	0.0	0.0	0.0	0.0
	SBA13			05/18/93	1.7	0.0	0.0	0.0	0.0
	SBA14			05/18/93	12.2	0.0	0.0	0.1	0.1
SBA15				05/18/93	443.8	15.0	15.1	14.4	86.8
NPS					0	0	0	0	0
SBA16				05/18/93	468.4	16.4	17.2	22.3	104.2
NPS					75.9	0.9	1.0	-39.0	-21.7
	SBA17			05/18/93	29.4	0.0	0.0	0.1	0.2
SBA18				05/18/93	363.2	15.4	16.2	61.2	125.7
NPS					52.7	3.6	4.1	-4.9	28.6
	SBA19			05/18/93	8.4	0.0	0.0	0.0	0.0
	SBA20			05/18/93	8.6	0.0	0.0	0.0	0.0
SBA21				05/18/93	293.4	11.8	12.1	66.1	97.1
NPS					41.4	10.8	11.1	64.0	89.0
SBB1				05/18/93	252.0	1.0	1.0	2.1	8.0
NPS					38.5	0.5	0.4	1.3	5.9
	NPS				72.9	0.6	0.5	1.0	4.5
SBB2				05/18/93	19.4	0.0	0.1	0.1	0.4
SBB3				05/18/93	159.7	0.4	0.5	1.0	3.1
	SBB4			05/18/93	3.5	0.1	0.1	1.0	1.1
	SBB5			05/18/93	104.8	0.4	0.4	0.8	1.6
	NPS				15.5	0.1	0.1	0.4	1.2
		SBB8		05/18/93	89.3	0.3	0.3	0.3	0.4
		NPS			18.9	0.2	0.2	-1.5	-1.6
		SBB9		05/18/93	22.5	0.1	0.1	0.0	0.2
		SBB6		05/18/93	34.5	0.0	0.0	0.0	0.0
		SBB7		05/18/93	13.4	0.0	0.0	1.8	1.9
SBB10				05/18/93	108.7	0.1	0.1	0.0	0.5
NPS					74.7	0.0	0.1	-0.0	0.3
	SBB11			05/18/93	23.5	0.0	0.0	0.0	0.0
	NPS				-101.7	-0.0	-0.0	-0.1	-0.2
		SBB12		05/18/93	103.8	0.1	0.1	0.0	0.0
		SBB13		05/18/93	20.4	0.0	0.0	0.0	0.0
		NPS			19.0	0.0	0.0	-0.0	-0.0
			SBB20	05/18/93	0.7	0.0	0.0	0.0	0.0
			SBB21	05/18/93	0.7	0.0	0.0	0.0	0.0
		SBB14		05/18/93	1.0	0.0	0.0	0.1	0.2
SBB15				05/18/93	10.5	0.0	0.0	0.0	0.1
NPS					-15.4	0.0	0.0	-0.0	-0.0
	SBB16			05/18/93	24.4	0.0	0.0	0.0	0.0
SBB17				05/18/93	1.6	0.0	0.0	0.1	0.1
NPS					0.6	0.0	0.0	0.0	0.0
	SBB19			05/18/93	0.4	0.0	0.0	0.0	0.0
SBB18				05/18/93	0.6	0.0	0.0	0.0	0.1

Loading Evaluation Data
NPS = Non-Point Source

Main Trib	Primar Trib	Second Trib	Third Trib	DATE	Al (lbs\day) TOTAL	As (lbs\day) DISS.	As (lbs\day) TOTAL	Cd (lbs\day) DISS.	Cd (lbs\day) TOTAL
SBA1				05/18/93	100.5	0.00	0.24	0.24	0.24
NPS					-43.6	-0.01	-0.08	0.13	0.11
SBA3				05/18/93	68.0	0.01	0.31	0.11	0.13
SBA2				05/18/93	76.1	0.00	0.00	0.00	0.00
NPS					8.8	0.01	0.05	0.01	0.02
SBA4				05/18/93	59.1	0.00	0.26	0.10	0.11
NPS					-0.2	-0.05	0.05	0.00	-0.09
	SBA5			05/18/93	1.1	0.00	0.01	0.00	0.00
SBA6				05/18/93	58.2	0.05	0.20	0.10	0.11
NPS					-22.0	0.04	-0.08	-0.07	-0.06
	SBA7			05/18/93	0.0	0.00	0.00	0.00	0.00
SBA8				05/18/93	80.2	0.01	0.28	0.17	0.17
NPS					-52.6	-0.01	-0.01	0.04	-0.01
	SBA9			05/18/93	0.6	0.00	0.00	0.00	0.00
SBA10				05/18/93	132.1	0.02	0.30	0.13	0.18
NPS					52.6	-0.03	0.08	0.05	0.08
SBA11				05/18/93	79.6	0.05	0.21	0.09	0.10
NPS					-7.8	0.04	-0.02	-0.01	-0.01
	SBA12			05/18/93	0.0	0.00	0.00	0.00	0.00
	SBA13			05/18/93	0.0	0.00	0.00	0.00	0.00
	SBA14			05/18/93	0.0	0.00	0.00	0.00	0.00
SBA15				05/18/93	87.3	0.01	0.23	0.10	0.11
NPS					0	0	0	0	0
SBA16				05/18/93	88.3	0.06	0.25	0.09	0.12
NPS					8.9	-0.11	-0.02	-0.01	0.00
	SBA17			05/18/93	0.6	0.00	0.00	0.00	0.00
SBA18				05/18/93	78.8	0.17	0.27	0.10	0.11
NPS					19.6	0.02	-0.09	0.04	0.03
	SBA19			05/18/93	0.0	0.00	0.00	0.00	0.00
	SBA20			05/18/93	0.0	0.00	0.00	0.00	0.00
SBA21				05/18/93	59.1	0.15	0.35	0.06	0.08
NPS					41.6	0.11	0.30	0.02	0.04
SBB1				05/18/93	17.5	0.04	0.05	0.04	0.04
NPS					6.6	0.02	0.03	0.01	0.00
	NPS				8.0	0.03	0.04	0.01	0.01
SBB2				05/18/93	1.1	0.00	0.00	0.00	0.00
SBB3				05/18/93	8.4	0.02	0.02	0.03	0.03
	SBB4			05/18/93	1.5	0.00	0.00	0.00	0.00
	SBB5			05/18/93	9.3	0.02	0.03	0.01	0.01
	NPS				4.5	0.02	0.02	-0.00	-0.00
		SBB8		05/18/93	4.9	0.01	0.01	0.01	0.02
		NPS			3.2	0.00	0.00	0.00	0.01
		SBB9		05/18/93	0.7	0.00	0.00	0.00	0.00
		SBB6		05/18/93	0.1	0.00	0.00	0.00	0.00
		SBB7		05/18/93	1.0	0.00	0.00	0.00	0.00
SBB10				05/18/93	1.5	0.00	0.00	0.02	0.03
NPS					0.6	0.00	0.00	0.01	0.02
	SBB11			05/18/93	0.3	0.00	0.00	0.01	0.01
	NPS				-1.5	-0.00	-0.01	-0.02	-0.02
		SBB12		05/18/93	1.3	0.00	0.00	0.03	0.03
		SBB13		05/18/93	0.2	0.00	0.00	0.00	0.00
		NPS			0.1	0.00	0.00	0.00	0.00
			SBB20	05/18/93	0.0	0.00	0.00	0.00	0.00
			SBB21	05/18/93	0.1	0.00	0.00	0.00	0.00
		SBB14		05/18/93	0.3	0.00	0.01	0.00	0.00
SBB15				05/18/93	0.5	0.00	0.00	0.00	0.00
NPS					0.0	0.00	-0.00	-0.00	0.00
	SBB16			05/18/93	0.1	0.00	0.00	0.00	0.00
SBB17				05/18/93	0.4	0.00	0.00	0.00	0.00
NPS					0.1	-0.00	-0.00	0.00	0.00
	SBB19			05/18/93	0.0	0.00	0.00	0.00	0.00
SBB18				05/18/93	0.2	0.00	0.00	0.00	0.00

Loading Evaluation Data
NPS = Non-Point Source

Main Trib	Primar Trib	Second Trib	Third Trib	DATE	FLOW (gpm)	SULFATE (lbs\day)	Al (lbs\day) DISS.
SBA1				05/18/93	6649.0	4292.6	22.7
NPS					-474.0	-1255.0	-28.8
SBA3				05/18/93	905.0	2563.0	12.4
SBA2				05/18/93	6218.0	2984.6	39.1
NPS					124.0	304.3	-2.2
SBA4				05/18/93	781.0	2258.7	14.6
NPS					6.6	146.1	-37.4
	SBA5			05/18/93	274.4	36.6	0.6
SBA6				05/18/93	500.0	2076.0	51.4
NPS					-120.0	-533.4	-26.6
	SBA7			05/18/93	1.0	2.2	0.0
SBA8				05/18/93	619.0	2607.2	78.0
NPS					-86.8	-603.6	-29.3
	SBA9			05/18/93	21.8	91.8	0.6
SBA10				05/18/93	684.0	3119.0	106.7
NPS					264.3	1205.2	27.6
SBA11				05/18/93	419.7	1913.8	79.1
NPS					1.0	-244.4	1.9
	SBA12			05/18/93	1.8	0.7	0.0
	SBA13			05/18/93	2.7	2.9	0.0
	SBA14			05/18/93	12.2	22.4	0.0
SBA15				05/18/93	402.0	2132.2	77.2
NPS					0	0	0
SBA16				05/18/93	402.0	2320.3	88.3
NPS					50.4	430.7	15.1
	SBA17			05/18/93	118.8	57.0	0.2
SBA18				05/18/93	232.8	1832.6	72.9
NPS					37.7	377.5	15.2
	SBA19			05/18/93	14.1	2.8	0.0
	SBA20			05/18/93	10.0	9.7	0.0
SBA21				05/18/93	171.0	1442.6	57.7
NPS					-11.6	263.7	40.9
SBB1				05/18/93	182.6	1178.9	16.7
NPS					40.7	312.9	8.3
	NPS				49.6	334.8	9.1
SBB2				05/18/93	14.2	90.0	1.0
SBB3				05/18/93	118.8	754.1	6.6
	SBB4			05/18/93	1.5	27.5	1.5
	SBB5			05/18/93	45.0	489.2	8.2
	NPS				14.0	140.3	3.7
		SBB8		05/18/93	31.0	348.9	4.5
		NPS			-12.9	40.1	2.8
		SBB9		05/18/93	6.1	87.7	0.6
		SBB6		05/18/93	27.4	144.0	0.0
		SBB7		05/18/93	10.4	77.1	1.0
SBB10				05/18/93	96.9	376.7	0.3
NPS					50.5	253.4	0.2
	SBB11			05/18/93	20.0	91.7	0.1
	NPS				-92.6	-379.1	-0.3
		SBB12		05/18/93	71.5	399.0	0.0
		SBB13		05/18/93	22.3	67.7	0.1
		NPS			0.4	67.7	0.0
			SBB20	05/18/93	12.0	0.0	0.0
			SBB21	05/18/93	9.9	0.0	0.1
		SBB14		05/18/93	18.8	4.1	0.3
SBB15				05/18/93	26.4	31.7	0.0
NPS					5.7	-47.8	-0.2
	SBB16			05/18/93	6.7	75.7	0.0
SBB17				05/18/93	14.0	3.8	0.2
NPS					2.0	3.1	0.0
	SBB19			05/18/93	1.0	0.7	0.0
SBB18				05/18/93	11.0	0.0	0.2

Loading Evaluation Data
Low-Flow Event, August, 1993
NPS=Non-Point Source

SBC	Primary Trib.	Secondary Trib.	DATE	FLOW GPM	SULFATE (lbs/day)	Al (lbs/day) DISS.	Al (lbs/day) TOTAL	As (lbs/day) DISS.	As (lbs/day) TOTAL
	SBB16A		08/24/93	0.2	2.7	0.0	0.0	0.00	0.00
	SBB15A		08/24/93	0.0	0.0	0.0	0.0	0.00	0.00
		SBB12A	08/24/93	2.3	16.6	0.0	0.0	0.00	0.00
		SBB11	08/24/93	0.0	0.0	0.0	0.0	0.00	0.00
SBB10A			08/24/93	4.1	18.8	0.0	0.1	0.00	0.00
NPS				11.5	74.8	0.6	0.6	0.00	0.00
SBB10B			08/24/93	15.6	93.6	0.7	0.7	0.00	0.00
		SBB9B	08/24/93	1.2	2.8	0.1	0.1	0.00	0.00
		SBB9A	08/24/93	1.7	15.9	0.1	0.1	0.00	0.00
	NPS			1.7	15.8	0.1	0.1	0.00	0.00
	SBB9		08/24/93	4.6	34.5	0.3	0.3	0.00	0.00
NPS				-5.0	-30.0	0.2	0.2	0.00	0.00
SBB8			08/24/93	15.2	98.1	1.2	1.2	0.00	0.00
NPS				7.1	77.4	2.8	3.0	0.00	0.00
SBB5			08/24/93	22.3	175.5	4.0	4.2	0.01	0.01
	SBB4A		08/24/93	1.1	27.1	2.2	2.2	0.00	0.00
NPS				4.6	38.2	1.1	1.1	0.00	0.00
SBB1			08/24/93	28.0	240.9	7.3	7.5	0.01	0.01
NPS				1.0	35.1	1.3	1.2	-0.00	-0.00
SBA21A			08/24/93	29.0	276.0	8.5	8.6	0.00	0.01
NPS				-6.8	16.5	0.6	2.5	0.02	0.05
SBA21			08/24/93	22.2	292.5	9.2	11.1	0.02	0.05
NPS				-6.8	-64.7	1.3	-0.4	-0.01	-0.04
SBA18			08/24/93	15.4	227.9	10.5	10.7	0.01	0.01
	SBA17		08/24/93	15.4	2.3	0.0	0.1	0.00	0.00
NPS				-3.4	-47.0	-1.6	-1.2	0.00	0.00
SBA16			08/24/93	27.4	183.1	8.9	9.6	0.01	0.01
NPS				4.7	-5.6	-0.7	-1.3	-0.00	-0.00
SBA15			08/24/93	32.1	177.6	8.2	8.3	0.01	0.01
	SBA14		08/24/93	8.0	13.7	0.0	0.0	0.00	0.00
	SBA13		08/24/93	0.1	0.1	0.0	0.0	0.00	0.00
	SBA12		08/24/93	0.1	0.0	0.0	0.0	0.00	0.00
NPS				2.6	2.7	-3.2	-1.6	-0.00	0.00
SBA11			08/24/93	42.8	194.1	5.0	6.7	0.01	0.01
NPS				37.0	167.8	5.0	5.2	0.01	0.01
SBA10			08/24/93	79.8	362.0	10.1	11.9	0.01	0.02
	SBA9		08/24/93	3.1	18.4	0.0	0.1	0.00	0.00
NPS				0.9	-0.2	-0.0	0.0	0.00	0.00
SBA8			08/24/93	83.8	380.1	10.1	12.0	0.02	0.02
	SBA7		08/24/93	0.5	0.8	0.0	0.0	0.00	0.00
NPS				-15.7	-83.7	-3.0	-3.5	-0.00	-0.01
SBA6			08/24/93	68.6	297.2	7.1	8.5	0.01	0.01
	SBA5		08/24/93	41.0	6.2	0.0	0.0	0.00	0.00
NPS				70.0	127.7	-6.7	3.6	-0.01	0.00
SBA4			08/24/93	179.6	431.0	0.4	12.1	0.00	0.02
NPS				27.3	65.5	-0.1	0.1	0.00	0.01
SBA3			08/24/93	206.9	496.6	0.3	12.2	0.00	0.03
SBA2			08/24/93	849.0	127.4	0.0	0.0	0.00	0.00
NPS				-3.9	7.3	-0.3	-2.3	0.00	-0.01
SBA1			08/24/93	1052.0	631.2	0.0	9.9	0.00	0.01

Loading Evaluation Data
Low-Flow Event, August, 1993
NPS = Non-Point Source

SBC	Primary Trib.	Secondary Trib.	DATE	Fe (lbs/day) TOTAL	Pb (lbs/day) DISS.	Pb (lbs/day) TOTAL	Mg (lbs/day) DISS.	Mn (lbs/day) DISS.	Mn (lbs/day) TOTAL
	SBB16A		08/24/93	0.0	0.00	0.00	0.2	0.0	0.0
	SBB15A		08/24/93	0.0	0.00	0.00	0.0	0.0	0.0
		SBB12A	08/24/93	0.0	0.00	0.00	1.3	0.0	0.0
		SBB11	08/24/93	0.0	0.00	0.00	0.0	0.0	0.0
SBB10A			08/24/93	0.0	0.00	0.00	1.4	0.1	0.1
NPS				0.0	0.00	-0.00	5.2	0.8	0.8
SBB10B			08/24/93	0.0	0.00	0.00	6.6	0.9	0.9
		SBB9B	08/24/93	0.0	0.00	0.00	0.5	0.1	0.1
		SBB9A	08/24/93	0.0	0.00	0.00	1.2	0.2	0.2
	NPS			0.0	0.00	0.00	0.8	0.2	0.2
	SBB9		08/24/93	0.0	0.00	0.00	2.6	0.4	0.5
NPS				0.0	0.00	0.00	-2.4	-0.3	-0.4
SBB8			08/24/93	0.1	0.00	0.00	6.9	1.0	1.0
NPS				1.7	0.00	0.00	3.3	0.8	0.8
SBB5			08/24/93	1.8	0.00	0.00	10.2	1.8	1.9
	SBB4A		08/24/93	1.2	0.00	0.00	0.9	0.2	0.2
NPS				0.5	0.00	0.00	2.4	1.0	1.3
SBB1			08/24/93	3.5	0.00	0.00	13.5	3.0	3.3
NPS				1.0	0.00	0.00	1.0	-0.1	-0.3
SBA21A			08/24/93	4.5	0.00	0.00	14.5	2.9	3.0
NPS				5.8	0.00	0.00	-2.4	-0.5	-0.3
SBA21			08/24/93	10.3	0.00	0.00	12.2	2.4	2.7
NPS				-1.5	0.00	0.00	-3.7	-0.4	-0.6
SBA18			08/24/93	8.8	0.00	0.00	8.4	2.0	2.1
	SBA17		08/24/93	0.0	0.00	0.00	0.9	0.0	0.0
NPS				-1.6	0.00	0.00	-0.7	-0.3	-0.2
SBA16			08/24/93	7.1	0.00	0.00	8.6	1.8	1.8
NPS				-3.2	0.00	0.00	0.5	-0.1	-0.2
SBA15			08/24/93	4.0	0.00	0.00	9.1	1.6	1.7
	SBA14		08/24/93	0.1	0.00	0.00	1.4	0.1	0.1
	SBA13		08/24/93	0.0	0.00	0.00	0.0	0.0	0.0
	SBA12		08/24/93	0.0	0.00	0.00	0.0	0.0	0.0
NPS				-0.7	0.00	0.00	0.2	-0.0	-0.0
SBA11			08/24/93	3.3	0.00	0.00	10.7	1.7	1.7
NPS				2.5	0.00	0.00	9.6	1.5	1.5
SBA10			08/24/93	5.9	0.00	0.00	20.3	3.2	3.2
	SBA9		08/24/93	0.0	0.00	0.00	1.3	0.2	0.2
NPS				-0.3	0.00	0.00	0.2	-0.1	0.0
SBA8			08/24/93	5.5	0.00	0.00	21.8	3.3	3.4
	SBA7		08/24/93	0.0	0.00	0.00	0.1	0.0	0.0
NPS				-2.5	0.00	0.00	-4.2	-0.8	-0.9
SBA6			08/24/93	3.0	0.00	0.00	17.7	2.5	2.5
	SBA5		08/24/93	0.1	0.00	0.00	3.5	0.0	0.0
NPS				0.8	0.00	0.00	10.0	1.1	1.1
SBA4			08/24/93	3.9	0.00	0.00	31.3	3.6	3.6
NPS				0.1	0.00	0.00	5.7	-0.1	0.0
SBA3			08/24/93	4.0	0.00	0.00	37.0	3.5	3.6
SBA2			08/24/93	1.6	0.00	0.00	87.8	0.0	0.0
NPS				-0.9	0.00	0.00	0.8	-1.1	-1.1
SBA1			08/24/93	4.7	0.00	0.00	125.6	2.4	2.5

Loading Evaluation Data
Low-Flow Event, August, 1993
NPS=Non-Point Source

SBC	Primary Trib.	Secondary Trib.	DATE	Hg (lbs/day) DISS.	Hg (lbs/day) TOTAL	K (lbs/day) DISS.	Se (lbs/day) DISS.	Se (lbs/day) TOTAL	Ag (lbs/day) DISS.
	SBB16A		08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
	SBB15A		08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
		SBB12A	08/24/93	0.0	0.0	0.1	0.0	0.0	0.0
		SBB11	08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
SBB10A			08/24/93	0.0	0.0	0.2	0.0	0.0	0.0
NPS				0.0	0.0	0.5	0.0	0.0	0.0
SBB10B			08/24/93	0.0	0.0	0.7	0.0	0.0	0.0
		SBB9B	08/24/93	0.0	0.0	0.1	0.0	0.0	0.0
		SBB9A	08/24/93	0.0	0.0	0.1	0.0	0.0	0.0
	NPS			0.0	0.0	0.1	0.0	0.0	0.0
	SBB9		08/24/93	0.0	0.0	0.2	0.0	0.0	0.0
NPS				0.0	0.0	-0.2	0.0	0.0	0.0
SBB8			08/24/93	0.0	0.0	0.7	0.0	0.0	0.0
NPS				0.0	0.0	0.2	0.0	0.0	0.0
SBB5			08/24/93	0.0	0.0	0.9	0.0	0.0	0.0
	SBB4A		08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
NPS				0.0	0.0	0.1	0.0	0.0	0.0
SBB1			08/24/93	0.0	0.0	1.0	0.0	0.0	0.0
NPS				0.0	0.0	0.1	0.0	0.0	-0.0
SBA21A			08/24/93	0.0	0.0	1.1	0.0	0.0	0.0
NPS				0.0	0.0	-0.3	0.0	0.0	0.0
SBA21			08/24/93	0.0	0.0	0.7	0.0	0.0	0.0
NPS				0.0	0.0	-0.3	0.0	0.0	0.0
SBA18			08/24/93	0.0	0.0	0.5	0.0	0.0	0.0
	SBA17		08/24/93	0.0	0.0	0.1	0.0	0.0	0.0
NPS				0.0	0.0	-0.1	0.0	0.0	0.0
SBA16			08/24/93	0.0	0.0	0.5	0.0	0.0	0.0
NPS				0.0	0.0	0.3	0.0	0.0	0.0
SBA15			08/24/93	0.0	0.0	0.8	0.0	0.0	0.0
	SBA14		08/24/93	0.0	0.0	0.4	0.0	0.0	0.0
	SBA13		08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
	SBA12		08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
NPS				0.0	0.0	0.2	0.0	0.0	0.0
SBA11			08/24/93	0.0	0.0	1.3	0.0	0.0	0.0
NPS				0.0	0.0	1.2	0.0	0.0	0.0
SBA10			08/24/93	0.0	0.0	2.6	0.0	0.0	0.0
	SBA9		08/24/93	0.0	0.0	0.3	0.0	0.0	0.0
NPS				0.0	0.0	-0.0	0.0	0.0	0.0
SBA8			08/24/93	0.0	0.0	2.8	0.0	0.0	0.0
	SBA7		08/24/93	0.0	0.0	0.0	0.0	0.0	0.0
NPS				0.0	0.0	-0.3	0.0	0.0	0.0
SBA6			08/24/93	0.0	0.0	2.6	0.0	0.0	0.0
	SBA5		08/24/93	0.0	0.0	0.6	0.0	0.0	0.0
NPS				0.0	0.0	1.3	0.0	0.0	0.0
SBA4			08/24/93	0.0	0.0	4.4	0.0	0.0	0.0
NPS				0.0	0.0	0.7	0.0	0.0	0.0
SBA3			08/24/93	0.0	0.0	5.1	0.0	0.0	0.0
SBA2			08/24/93	0.0	0.0	19.8	0.0	0.0	0.0
NPS				0.0	0.0	0.1	0.0	0.0	0.0
SBA1			08/24/93	0.0	0.0	25.0	0.0	0.0	0.0

Loading Evaluation Data
Low-Flow Event, August, 1993
NPS = Non-Point Source

SBC	Primary Trib.	Secondary Trib.	DATE	Ag (lbs/day) TOTAL	Na (lbs/day) DISS.	Zn (lbs/day) DISS.	Zn (lbs/day) TOTAL
	SBB16A		08/24/93	0.0	0.1	0.0	0.0
	SBB15A		08/24/93	0.0	0.0	0.0	0.0
		SBB12A	08/24/93	0.0	0.3	0.0	0.0
		SBB11	08/24/93	0.0	0.0	0.0	0.0
SBB10A			08/24/93	0.0	0.4	0.0	0.0
NPS				0.0	1.1	0.1	0.1
SBB10B			08/24/93	0.0	1.5	0.1	0.1
		SBB9B	08/24/93	0.0	0.1	0.0	0.0
		SBB9A	08/24/93	0.0	0.2	0.0	0.0
	NPS			0.0	0.2	0.0	0.0
	SBB9		08/24/93	0.0	0.5	0.0	0.0
NPS				0.0	-0.5	-0.0	-0.0
SBB8			08/24/93	0.0	1.5	0.1	0.1
NPS				0.0	0.8	0.2	0.2
SBB5			08/24/93	0.0	2.3	0.3	0.3
	SBB4A		08/24/93	0.0	0.2	0.1	0.1
NPS				0.0	0.6	0.1	0.1
SBB1			08/24/93	0.0	3.1	0.5	0.5
NPS				-0.0	0.2	0.1	0.2
SBA21A			08/24/93	0.0	3.2	0.6	0.6
NPS				0.0	-0.4	-0.1	-0.1
SBA21			08/24/93	0.0	2.8	0.5	0.6
NPS				0.0	-0.7	-0.0	-0.1
SBA18			08/24/93	0.0	2.2	0.5	0.5
	SBA17		08/24/93	0.0	0.7	0.0	0.0
NPS				0.0	-0.2	-0.0	-0.0
SBA16			08/24/93	0.0	2.6	0.5	0.5
NPS				0.0	0.3	-0.0	0.0
SBA15			08/24/93	0.0	2.9	0.5	0.5
	SBA14		08/24/93	0.0	0.7	0.0	0.0
	SBA13		08/24/93	0.0	0.0	0.0	0.0
	SBA12		08/24/93	0.0	0.0	0.0	0.0
NPS				0.0	-0.0	-0.1	-0.1
SBA11			08/24/93	0.0	3.6	0.4	0.4
NPS				0.0	3.2	0.4	0.4
SBA10			08/24/93	0.0	6.8	0.7	0.8
	SBA9		08/24/93	0.0	0.3	0.0	0.0
NPS				0.0	-0.0	-0.0	0.0
SBA8			08/24/93	0.0	7.2	0.8	0.8
	SBA7		08/24/93	0.0	0.0	0.0	0.0
NPS				0.0	-1.3	-0.2	-0.1
SBA6			08/24/93	0.0	5.9	0.6	0.7
	SBA5		08/24/93	0.0	1.7	0.0	0.0
NPS				0.0	3.7	0.2	0.4
SBA4			08/24/93	0.0	11.3	0.8	1.1
NPS				0.0	1.9	-0.3	-0.0
SBA3			08/24/93	0.0	13.2	0.5	1.1
SBA2			08/24/93	0.0	42.0	0.0	0.0
NPS				0.0	0.4	-0.5	-1.1
SBA1			08/24/93	0.0	55.5	0.0	0.0